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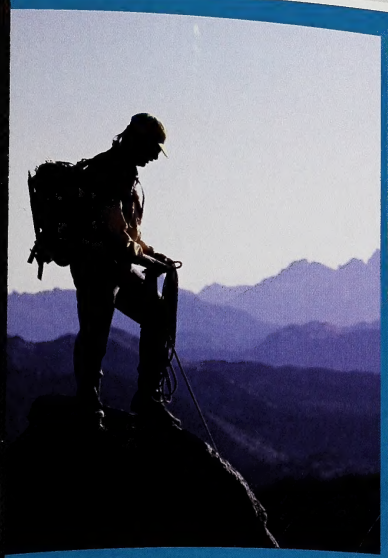
MATHEMATICS 14



Module 1
NUMBER

Learning Technologies Branch

Alberta LEARNING

MATHEMATICS 14

Module 1
NUMBER

Mathematics 14
Module 1: Number
Student Module Booklet
Learning Technologies Branch
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The Learning Technologies Branch acknowledges with appreciation the Alberta Distance Learning Centre and Pembina Hills Regional Division No. 7 for their review of this Student Module Booklet.

This document is intended for	
Students	✓
Teachers	✓
Administrators	
Home Instructors	
General Public	
Other	

You may find the following Internet sites useful:

- Alberta Learning, **http://www.learning.gov.ab.ca**
- Learning Technologies Branch, **http://www.learning.gov.ab.ca/ltb**
- Learning Resources Centre, **http://www.lrc.learning.gov.ab.ca**

The use of the Internet is optional. Exploring the electronic information superhighway can be educational and entertaining. However, be aware that these computer networks are not censored. Students may unintentionally or purposely find articles on the Internet that may be offensive or inappropriate. As well, the sources of information are not always cited and the content may not be accurate. Therefore, students may wish to confirm facts with a second source.

Welcome to MATHEMATICS 14

Mathematics 14 contains five modules. You should work through the modules in order (from 1 to 5) because concepts and skills introduced in one module will be reinforced, extended, and applied in later modules.

Module 1
NUMBER

Module 2
PATTERNS and EQUATIONS

Module 3
FRACTIONS, RATIO, and PERCENT

Module 4
MEASUREMENT

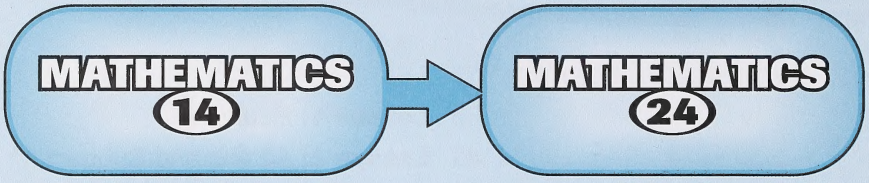
Module 5
GEOMETRY

CONTENTS

COURSE FEATURES

The Mathematics 14–24 Program

Mathematics 14 is the first course in the Mathematics 14–24 sequence of courses. If you successfully complete each of these five-credit courses, you will meet the minimum requirements in mathematics for an Alberta high school diploma.



The Mathematics 14–24 sequence is designed for students whose needs, interests, and abilities focus on basic mathematical understanding. This course sequence emphasizes the acquisition of practical life skills and proficiency in using mathematics to solve problems, adapt to change, interpret information, and build on previous knowledge.

Consult your teacher or counsellor for the latest information. Also, if you have access to the Internet, you can find out more about Mathematics 14 and high school requirements at the Alberta Learning website.

http://www.learning.gov.ab.ca

Take the time to look through the Student Module Booklets and the Assignment Booklets and notice the following design features:

- Each module has a Module Overview, Module Summary, and Review.
- Each module has several sections. Each section focuses on a big idea that is central to the topic being learned in the module.
- Each section has several lessons.
- Each module has a Glossary and an Answer Key in the Appendix. In several modules there are also special pull-out pages in the Appendix.
- Each module references the CD that accompanies your *Continuum* textbook.

Required Resources

There are no spaces provided in the Student Module Booklets for your answers. This means you will need a binder and loose-leaf paper or a notebook to do your work.

In order to complete the course, you will need a copy of the Mathematics 14 textbook, *Continuum*, a scientific calculator (such as the Texas Instruments TI-30X IIS), and various manipulatives (pattern blocks and fraction blocks). For your convenience, cut-out fraction blocks are provided in the Appendix of Module 3.

Pattern blocks and fraction blocks are available from the Learning Resources Centre. As of 2003, the product codes for these items were 161901 and 408288, respectively. Check for the latest ordering information at the LRC website.

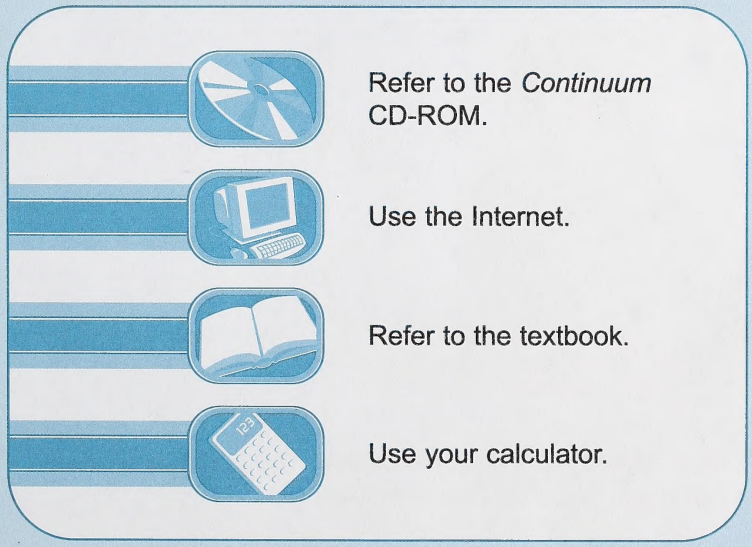
http://www.lrc.learning.gov.ab.ca

If you wish to complete the optional computer activities, you must have access to a computer that is connected to the Internet.

You will also need access to a computer to view material on the CD-ROM that accompanies your *Continuum* textbook.

Visual Cues

For your convenience, the most important mathematical rules and definitions are highlighted. Icons are also used as visual cues. Each icon tells you to do something.



ASSESSMENT AND FEEDBACK

The Mathematics 14 course is carefully designed to give you many opportunities to discover how well you are doing. In every lesson you will be asked to turn to the Appendix to check your answers. Completing the lessons and comparing your answers to the suggested answers in the Appendix will help you better understand math concepts, develop math skills, and improve your ability to communicate mathematically and solve problems.

If you are having difficulty with a lesson, refer to the Answer Key in the Appendix for hints or help. As well as giving suggested answers to the questions, the Answer Key gives you more information about the questions.

Twice in each module you will be asked to give your teacher your completed assignments to mark. Your teacher will give you feedback on how you are doing.

After your teacher marks an assignment, be sure to review your teacher's comments and correct any errors you made.

There will be a Final Test at the end of the course. You can prepare for the Final Test by completing the Review at the end of each module.

MODULE OVERVIEW

Darla and Erin live in a First Nation community in northern Alberta. Both girls play hockey for their school team. Darla plays goal and Erin is on left wing. Their dream is to play for Canada in the winter Olympic Games. In 2002 they watched Canada's women's and men's hockey teams win gold in Salt Lake City.

Darla and Erin keep track of their statistics. Darla is trying to reduce her goals-per-game average, which is a very respectable 2.25. Erin watches her plus/minus, which, after the team's loss to Fort Vermilion, is -2.

In this module you will explore integers and decimals and operations involving these numbers.

Module 1
NUMBER

Section 1
INTEGERS

Section 2
DECIMALS

Your mark on this module will be determined by how well you complete the two Assignment Booklets.

The mark distribution is as follows:

Assignment Booklet 1A

Section 1 Assignment	40 marks

Assignment Booklet 1B

Section 2 Assignment	40 marks
Final Module Assignment	20 marks
Total	100 marks

When doing the assignments, work slowly and carefully. Be sure you attempt each part of the assignments. If you are having difficulty, you may use your course materials to help you, but you must do the assignments by yourself.

You will submit Assignment Booklet 1A to your teacher before you begin Section 2. You will submit Assignment Booklet 1B to your teacher at the end of this module.

SECTION 1

Integers

In most parts of Canada, winter temperatures are below freezing. What do you think the temperature was when the photograph above was taken: $-20°C$, $-10°C$, $0°C$, or $+2°C$?

Temperatures, regardless of season, are most often expressed as **integers**—negative or positive whole numbers or zero.

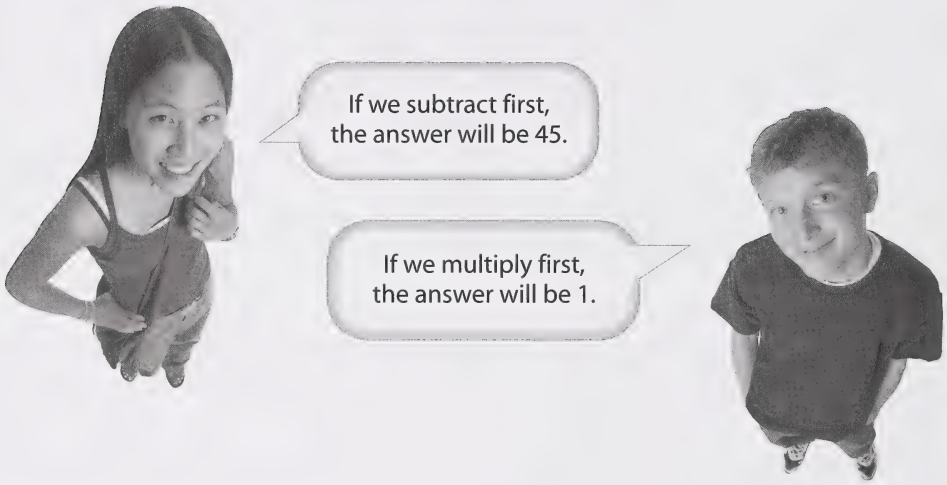
In this section you will investigate integers and how they are used. You will explore arithmetic expressions containing integers and you'll review basic operations involving integers and apply them in problem-solving situations.

LESSON 1

Order of Operations

Today you will investigate the order in which operations must be performed in arithmetic expressions.

Lyn and Ricky are discussing the order in which the operations must be performed in the expression $11-2\times5$.



Both answers can't be correct!

To find out the correct **order of operations**, turn to page 4 in your textbook and read the explanation at the top of the page. Then, work through Examples 1 to 3 on pages 4 and 5.

1. Turn to page 7 in your textbook. Do questions 1 and 2 of "Put into Practice."

2. Apply the order of operations to evaluate each expression.

   a. $3^2-2\times3+4(2+3)$

   b. $4(2\times3-6)+3\times4\div2$

Check your answers on pages 66 and 67 in the Appendix.

You must apply the rules for the order of operations carefully when translating words into arithmetic expressions.

Example

A car dealership advertises its basic compact model for $12 500. Air conditioning is $2000 extra. How much GST (7%) would you pay if you bought the car with air conditioning?

Write the expression for the GST and use the acronym BEDMAS to help you remember the order of operations.

The purchase price of the car is $\$12\,500 + \$2000$.

$$\begin{aligned} \text{GST} &= 0.07(\$12\,500 + \$2000) && \text{Remember, } 7\% = 0.07. \\ &= 0.07(\$14\,500) && \text{Do the brackets first.} \\ &= \$1015 && \text{Then multiply.} \end{aligned}$$

You would pay $1015 GST.

Example

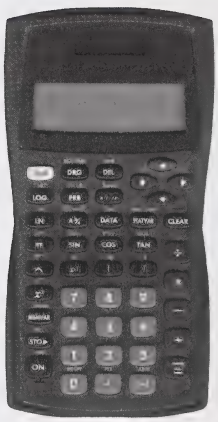
Write the expression to show that 25 is decreased by 30 divided by 6. Calculate the answer.

First, write the arithmetic expression. Then, use the acronym BEDMAS to help you remember the order of operations. Remember, to decrease means to subtract.

$$\begin{aligned} 25 - 30 \div 6 &= 25 - 5 && \text{Divide first.} \\ &= 20 && \text{Then subtract.} \end{aligned}$$

3. Turn to pages 7 and 8 in your textbook. Do question 3 and questions 5 to 10 of "Put into Practice."

Check your answers on pages 67 and 68 in the Appendix.



Most scientific calculators are programmed to handle the order of operations.

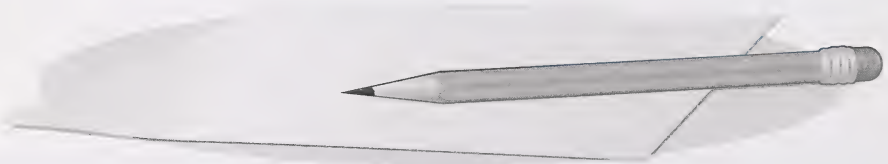
Example

Evaluate the expression $96 \div 2 - 3 \times 4^2$. Use a pencil-and-paper technique first, and then use your calculator. Compare your results.

Pencil and Paper

Use the acronym BEDMAS to help you remember the order of operations.

$$\begin{aligned} 96 \div 2 - 3 \times 4^2 &= 96 \div 2 - 3 \times 16 && \text{Do the exponents first.} \\ &= 48 - 48 && \text{Next, divide and multiply.} \\ &= 0 && \text{Subtract.} \end{aligned}$$



Calculator

Press the following keys on your calculator.

Did you get this answer on your calculator?

Turn to page 6 in your textbook. Work through the calculator activity. Then, put your calculator to use!

4. Use your calculator to evaluate each expression. Compare your answers with your results from question 2.

a. $3^2 - 2 \times 3 + 4(2+3)$

b. $4(2 \times 3 - 6) + 3 \times 4 \div 2$

Check your answers on page 68 in the Appendix.

Later in this section you will apply the order of operations when working with integers.

To review the concepts in this lesson, work through "Lesson 1: Order of Operations" on the CD-ROM that accompanies your textbook.

Turn to the Section 1 Assignment in Assignment Booklet 1A. Answer questions 1 and 2.

LESSON 2

Integers

Today you will be introduced to integers and their application in everyday situations.

To win tournaments, professional golfers must often score under par. A score of three under par is represented by the integer -3. A score of four over par is represented by the integer $+4$. Remember, integers are positive or negative whole numbers. What integers would you use to record your golf score?

Did you know that Sandra Post was one of Canada's premier golfers? Sandra competed for 16 years and won nine official LPGA events. She was inducted into the Canadian Golf Hall of Fame in 1988.

If you have access to the Internet, you can access the following website to find out more about Sandra Post.

http://www.sandrapost.com

The golf course is not the only place you use integers!

To explore other everyday uses of integers, turn to page 9 in your textbook. Read the discussion about integers on this page.

1. Turn to page 10 in your textbook. Do questions 1 to 3 of "Put into Practice."

Check your answers on page 69 in the Appendix.

You can graph integers on a number line. A number line is like a thermometer laid on its side.

Example

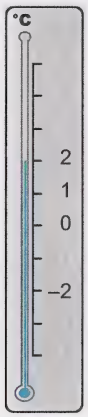
The following forecast for Paulatuk, NWT, is for a five-day period in September.

5 Day Forecast for Paulatuk, NWT

Thursday	Thursday night	Friday	Saturday	Sunday	Monday
					
Light rain — High 2°C	Light rain Low –2°C —	Chance of flurries Low –2°C High –2°C POP 30%	Cloudy Low –2°C High 2°C	Cloudy Low 0°C High 0°C	Cloudy Low 1°C High 1°C

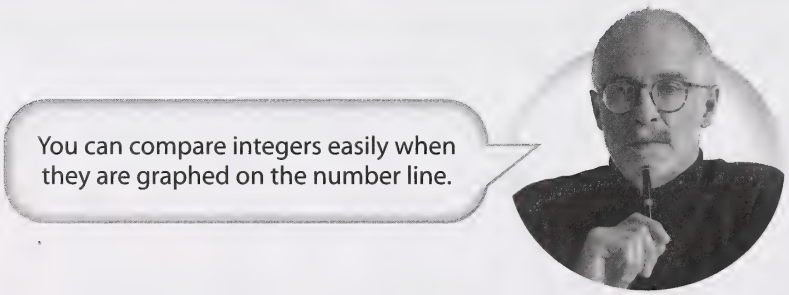
Show all the temperatures from the forecast on a thermometer and graph the corresponding integers on a number line.

To graph an integer on a number line, place a bold dot at its location.

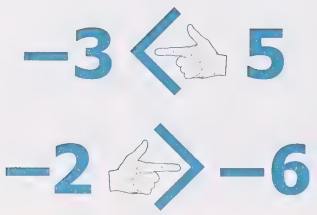


2. Turn to page 10 in your textbook. Do questions 4.a., 5.a., and 5.b. of "Put into Practice."

Check your answers on page 69 in the Appendix.



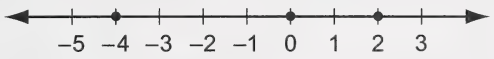
Turn to page 11 in your textbook. Read the explanation about comparing integers in the box on the top half of the page.



When you arrange integers and use the less than symbol (<) or the greater than symbol (>) to compare them, remember that both symbols always point to the smaller number!

Example

Graph -4, 2, and 0 on the number line. Next, write them from smallest to largest and then from largest to smallest.



The integers written from smallest to largest appear from left to right on the number line.

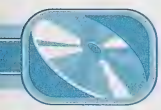
$-4 < 0 < 2$

The integers written from largest to smallest appear from right to left on the number line.

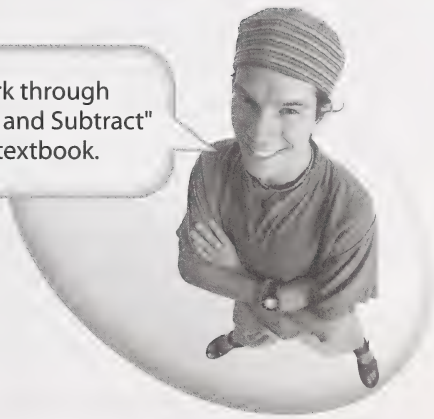
$2 > 0 > -4$

3. Turn to pages 11 and 12 in your textbook. Do questions 1.b., 2.b, 2.c., 3.a., 4.a., 5, 6.a., 7.b., 8, 9, 10, 11, and 12 of "Put into Practice."

Check your answers on pages 69 and 70 in the Appendix.



To review the concepts in this lesson, work through Topics 1, 2, and 3 of "Lesson 2: Integers—Add and Subtract" on the CD-ROM that accompanies your textbook.



Turn to the Section 1 Assignment in Assignment Booklet 1A. Answer questions 3 to 6.

LESSON 3

Adding Integers

Today you will examine how integers are added.

Samir and his friends are playing a music trivia game. They take turns asking each other the names of performers of current popular songs. If a player names the correct performer without a hint, he or she scores $+5$ points. If a player needs a hint to answer correctly, he or she scores $+3$ points. If a player does not name the performer, even with a hint, he or she scores -5 points. The player who reaches $+50$ first wins. This game involves combining integers.

In this lesson you will combine integers using coloured tiles. There is a page of integer tiles at the back of the Appendix. Pull out the page and cut out the individual tiles. The coloured tiles in the Appendix are red. The tiles shown in the examples, questions, and answers are blue, but they represent the same idea.

When the tiles are arranged with the coloured side up, they represent a positive integer.

Example

What does  represent?

A set of four coloured tiles represents $+4$.

When the tiles are arranged with the white side up, they represent a negative integer.

Example

What does  represent?

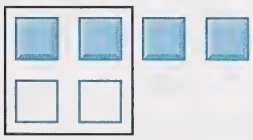
A set of three white tiles represents -3.

Now, to see how you can use these tiles to add integers, turn to page 13 in your textbook and read the discussion describing the **Zero Principle**. Then, work through the next example.

Example

Combine the following tiles and write the result as an addition sentence.

Use the Zero Principle and pair coloured tiles and white tiles to represent zero.



There are two zero pairs. There are two coloured tiles left over. Therefore, the **sum** is $+2$.

You can write the addition statement as follows.

$(+4)+(-2)=+2$

Turn to pages 14 and 15 in your textbook. Work through the examples on each page.

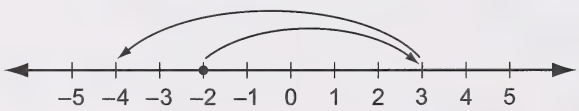
1. Do questions 2 and 3 of "Put into Practice" on page 14.
2. Do questions 1, 2.a., 2.b., 3.d., 4.b., 4.d., and 6 of "Put into Practice" on page 15.

Check your answers on pages 71 and 72 in the Appendix.

Turn to page 16 in your textbook. Read "Investigation" at the top of the page. Then, work through the example on page 16. You can use the number line to add more than two integers!

Example

Use the number line to calculate $(-2)+(+5)+(-7)$.



Start at -2, move 5 units to the right, and then move 7 units to the left.

Therefore, $(-2)+(+5)+(-7)=-4$.

3. Turn to pages 16 to 18 in your textbook. Do questions 2, 4, 6, and 8 of "Put into Practice."

Check your answers on pages 72 to 74 in the Appendix.

To review the concepts in this lesson, work through Topics 4 and 5 of "Lesson 2: Integers—Add and Subtract" on the CD-ROM that accompanies your textbook.

Turn to the Section 1 Assignment in Assignment Booklet 1A. Answer questions 7 to 10.

LESSON 4

Subtracting Integers

Today you will examine how integers are subtracted.

Last month Clara borrowed $20 000 from her bank to purchase a new car. Today, she is going to transfer money from her savings account to cancel $5000 of this debt. Clara's transaction can be modelled by the following subtraction statement. Remember, an amount owing is represented by a negative number.

$$(-\$20\,000) - (-\$5000) = -\$15\,000$$

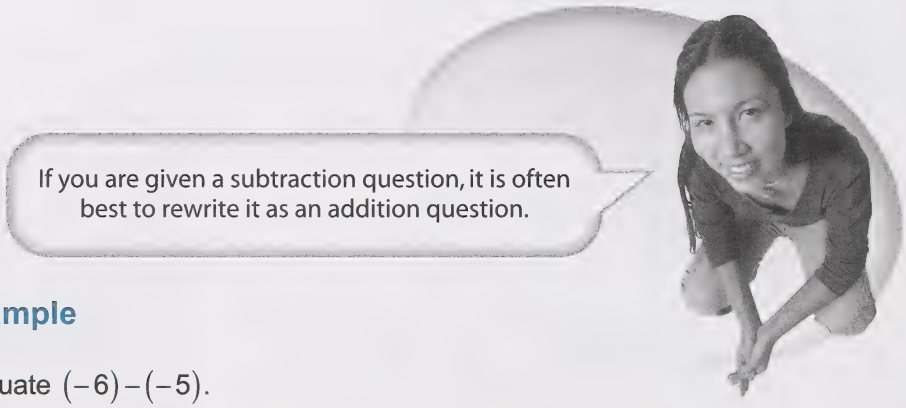
Do you agree that, after this transaction, she will owe only $15 000? Could you write an equivalent addition statement that gives the same answer?

Turn to pages 19 and 20 in your textbook. Work through Examples 1 to 3.

1. Turn to page 21 in your textbook. Do questions 1, 2.a., 2.c., 2.e., 2.g., and 3 of "Put into Practice."

Check your answers on pages 75 to 77 in the Appendix.

In the last set of examples and questions, you discovered that subtracting an integer is the same as adding the opposite integer.



Example

Evaluate $(-6)-(-5)$.

$$(-6)-(-5)=(-6)+(+5) \quad \text{The opposite of } -5 \text{ is } +5.$$
$$=-1$$

2. Turn to pages 21 and 22 in your textbook. Do questions 4 to 7 of "Put into Practice."

Check your answers on pages 77 to 79 in the Appendix.

If several integers are being combined in an arithmetic expression, change all the subtractions to additions. Next, you may find it easier to add all the negative integers and then all the positive integers. Find the final answer by combining your two results.

Example

Evaluate $(+5)+(-2)-(+6)+(+4)$.

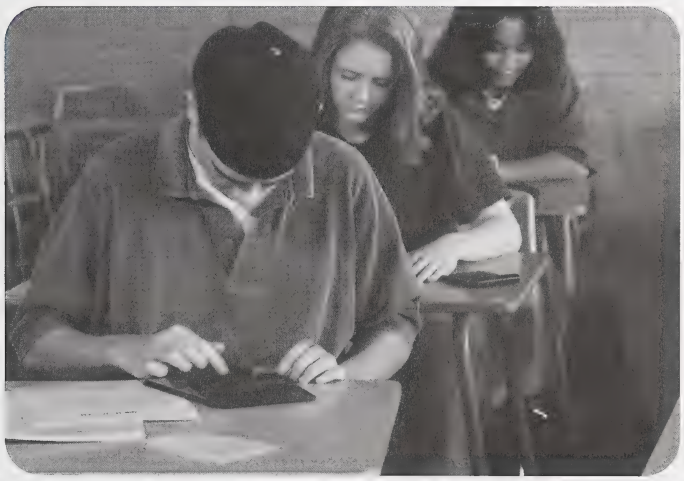
$$(+5)+(-2)-(+6)+(+4)=(+5)+(-2)+(-6)+(+4)$$
$$=(+9)+(-8)$$
$$=+1$$

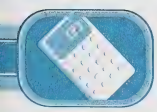
To subtract $(+6)$, add (-6).

$(+5)+(+4)=+9$ and $(-2)+(-6)=-8$.

3. Turn to page 23 in your textbook. Do questions 10.a., 10.c., 10.e., 10.g., and 10.i. of "Put into Practice."

Check your answers on page 80 in the Appendix.





You will probably use your calculator when combining several large integers. Refer to your calculator manual to see how to add and subtract integers. Is your calculator similar to the ones described at the top of page 23 in your textbook, or is it similar to the TI-30X IIS used in the following example?

Example

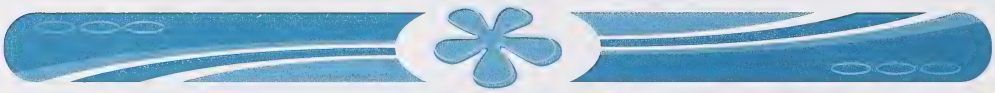
Evaluate $(-2)-(-7)+(+8)$.

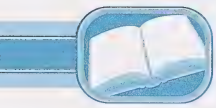
Clear the display of your calculator by pressing CLEAR.

Press the following sequence of buttons.

Notice that when the integer inside the brackets is positive, no sign is used. Here, $+8$ was simply entered as 8.

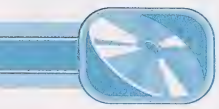
Did you get 13 as your answer?





4. Turn to page 23 in your textbook.
Do question 9 of "Put into Practice."

Check your answer on page 80 in the Appendix.



To review the main ideas of this lesson, work through Topics 6 and 7 of "Lesson 2: Integers—Add and Subtract" on the CD-ROM that accompanies your textbook.

Turn to the Section 1 Assignment in Assignment Booklet 1A.
Answer questions 11 to 13.

LESSON 5

Multiplying Integers

Today you will examine how integers are multiplied.

Some of the highest tides in the world occur in the Bay of Fundy between New Brunswick and Nova Scotia. The difference between low tide and high tide can exceed 14 m.

If you have access to the Internet, you can find out more about the tides along the Bay of Fundy at the following website:

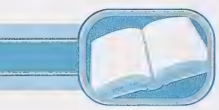
http://www.tourismnewbrunswick.ca/Cultures/en-CA/welcome.htm

The average sea level is represented as 0 m. If the sea level is 2 m above this average, it is represented by the integer $+2$ m. If the tide is 3 times as high, it would be $3\times(+2\text{ m})=6\text{ m}$.

If the sea level is 2 m below the average, it is represented by the integer -2 m. If the tide is 3 times lower, it would be $3\times(-2\text{ m})=-6\text{ m}$.

These two examples suggest the following rules:

- The product of a **positive** number multiplied by a **positive** number is a **positive** number.
- The product of a **negative** number multiplied by a **positive** number is a **negative** number.



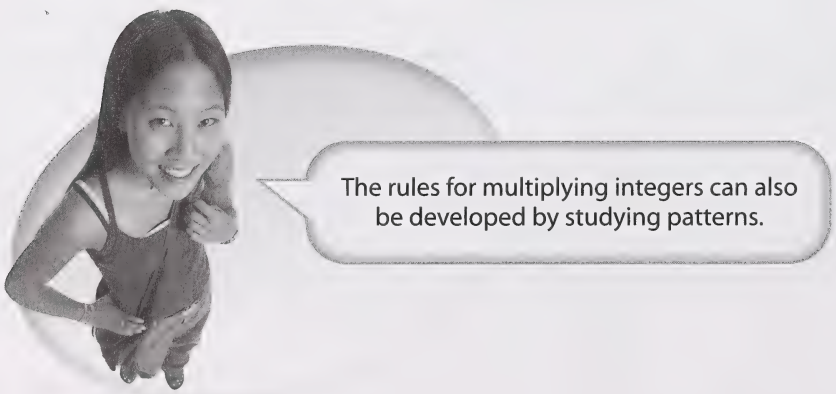
To check these rules, and to extend them to include what happens when a negative number is multiplied by another negative number, turn to pages 24 and 25 in your textbook. Use your tiles to work through the discussion on these two pages. Then, use your tiles to answer the following question.

1. Turn to page 27 in your textbook. Do question 1 of "Put into Practice."

Check your answer on page 81 in the Appendix.

Using your tiles, you confirmed the previous rules and extended them to include the following rule as well.

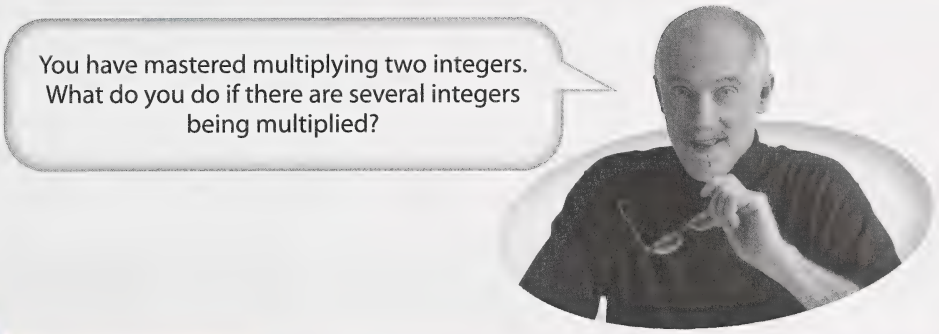
- The product of a **negative** number multiplied by a **negative** number is a **positive** number.



Turn to page 26 in your textbook and work through "Investigation." Next, you will use these patterns to answer the following questions.

2. Turn to pages 27 and 28 in your textbook. Do questions 2 to 4 of "Put into Practice."

Check your answers on pages 81 and 82 in the Appendix.



Looking Back

Remember from your previous mathematics courses that two or more numbers that are multiplied together are called **factors** and the answer is called the **product** of these factors.

Example

Evaluate the product $(3)(2)(5)$.

The numbers 3, 2, and 5 are the factors. Notice that there are no multiplication signs. Multiplication is understood by using the brackets.

So, $(3)(2)(5)$ is the same as $3\times2\times5$.

You can multiply from left to right.

$$(3)(2)(5) = (6)(5) \quad \leftarrow (3)(2)=6$$
$$= 30$$

To see how the previous example applies to integers, turn to page 28 in your textbook. Work through Examples 1 and 2.

If there is an **even number** of negative factors, the product is **positive**. If there is an **odd number** of negative factors, the product is **negative**.

Example

Determine the product $(-4)\times 6\times(-2)\times(-5)$.

There are three negative factors. Three is an odd number. Therefore, the product is negative.

$$(-4)\times 6\times(-2)\times(-5) = -(24\times 10) \text{ since } 6\times 4 = 24 \text{ and } 2\times 5 = 10$$
$$= -240$$

3. Turn to pages 28 and 29 in your textbook. Do questions 5 to 7 of "Put into Practice."

Check your answers on pages 82 and 83 in the Appendix.

Check your calculator's manual to see how integers are multiplied on your calculator. The following example outlines the keystrokes for the TI-30X IIS.

Example

Use your calculator to evaluate $-2\times -3\times +6$.

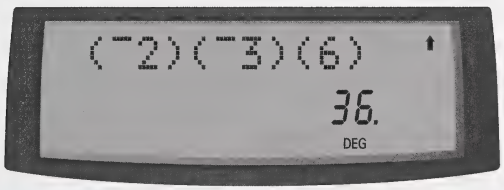
First, clear your calculator. Then press the following sequence of keys.

Note: $+6$ is simply entered as 6.

Therefore, $-2\times-3\times+6=36$.

You could have used brackets instead of multiplication signs.

Because $-2\times-3\times+6=(-2)(-3)(+6)$, you would get the same answer by pressing the following sequence of keys.



You will use your calculator in the next set of questions.

4. Turn to page 30 in your textbook. Do questions 1 and 2 of "Put into Practice."

Check your answers on pages 83 and 84 in the Appendix.

Turn to the Section 1 Assignment in Assignment Booklet 1A. Answer question 14.

LESSON 6

Dividing Integers

Today you will investigate dividing integers.

Daniel and three of his friends are eating at their favourite restaurant. The bill, including the tip, comes to \$44. The amount owed can be represented by the integer $-\$44$. If the four friends decide to split the bill equally, how much will each person owe? Do you agree each will pay \$11, since $-\$44 \div 4 = -\$11$?

The previous situation suggests that a negative number divided by a positive number is a negative number. This rule is similar to the corresponding rule for multiplication that says that the product of a negative number multiplied by a positive number is negative.

Are all the rules for division and multiplication the same? To find out, read on!

Turn to page 32 in your textbook. Work through the discussion involving algebra tiles.

1. Turn to pages 32 and 33 in your textbook. Do questions 1 to 3 of "Put into Practice."

Check your answers on page 84 in the Appendix.

Your work so far suggests the following rules:

- The quotient of a **positive** number divided by a **positive** number is a **positive** number.
- The quotient of a **negative** number divided by a **positive** number is a **negative** number.

To complete the discussion, recall the relationship between division and multiplication.

Looking Back

When talking about division, mathematicians use three special words. Their use is shown in the following two equations.

$$\text{quotient} = \frac{\text{dividend}}{\text{divisor}} \text{ or quotient} = \text{dividend} \div \text{divisor}$$

You can check your division by multiplying the quotient by the divisor. If your work is correct, the multiplication will give the dividend as the answer.

Example

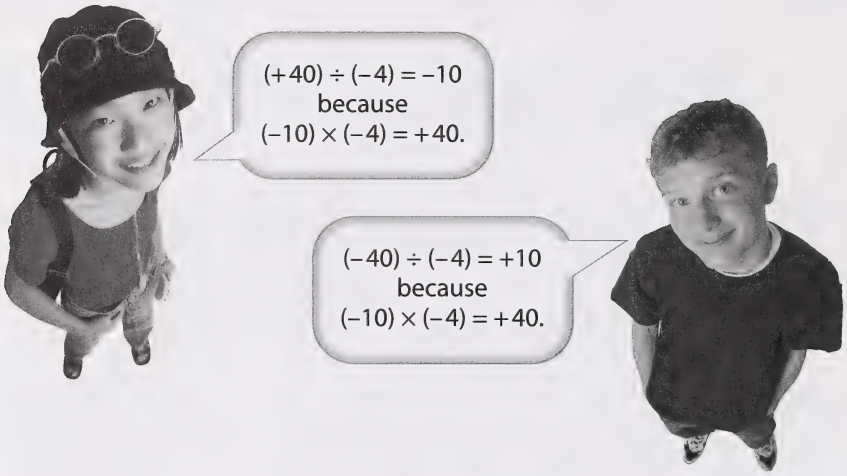
Divide 40 by 4. Check your answer.

$40 \div 4 = 10$ ← Quotient

Dividend ↗ ↑ Divisor

Check by multiplying the quotient by the divisor. The answer is correct since $10 \times 4 = 40$, which is the original number being divided. Because multiplication can reverse a division to produce the original number, division and multiplication are said to be **inverse operations**.

You will use the fact that division and multiplication are inverse operations to develop the remaining rules for dividing integers.



These examples illustrate the following two rules for division:

- The quotient of a **positive** number divided by a **negative** number is a **negative** number.
- The quotient of a **negative** number divided by a **negative** number is a **positive** number.

You will now apply all the rules for dividing integers.

Turn to page 35 in your textbook. Work through the discussion at the top of the page.

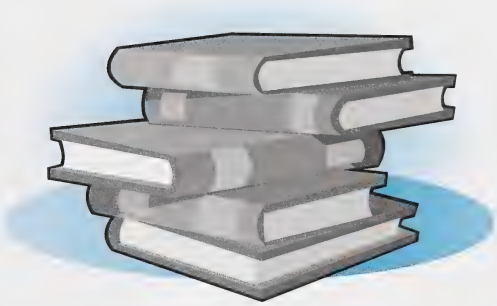
2. Turn to pages 35 and 36 in your textbook. Do questions 1, 2, 4, 5.b., 5.c., and 6 of "Put into Practice."

Check your answers on pages 85 and 86 in the Appendix.

Integers are used to solve a variety of problem situations.

Example

A publisher prints 15 000 copies of a novel. The publisher's cost is \$15 per book. The publisher sells the book to bookstores for \$25 per copy. What is the publisher's profit or loss if 12 000 copies of the novel are sold?



For every book sold, the publisher makes $\$25 - \$15$, or \$10. The publisher's loss for each unsold book is \$15. This loss can be represented by the negative integer $-\$15$.

The publisher sells 12 000 books. So, 3000 books are unsold.

$$\begin{aligned}\text{profit or loss} &= 12\,000(\$10) + 3000(-\$15)\\ &= \$120\,000 + (-\$45\,000)\\ &= \$75\,000\end{aligned}$$

Because the answer is positive, the publisher makes a profit of \$75 000.

3. Turn to pages 37 and 38 in your textbook. Do questions 1 to 6 of "Put into Practice."

Check your answers on pages 86 to 89 in the Appendix.

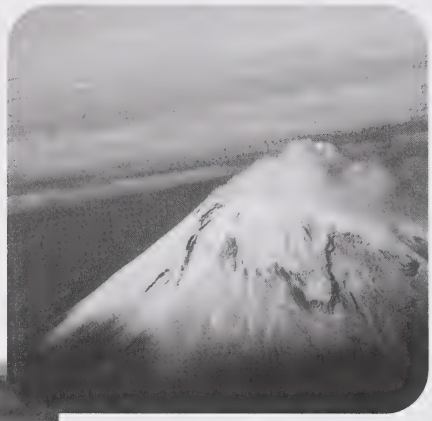
To review the procedure for multiplication and division, work through "Lesson 3: Integers—Multiply and Divide" on the CD-ROM that accompanies your textbook.

Turn to the Section 1 Assignment in Assignment Booklet 1A. Answer questions 15, 16, 17, 18, and 19.

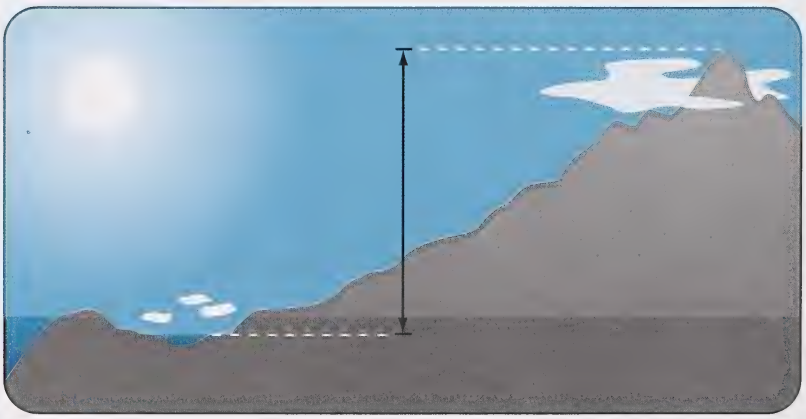
When you are done, submit Assignment Booklet 1A to your teacher to be marked.

CONCLUSION

In this section you explored integers and operations involving integers. You reviewed the order in which operations must be performed and how integers and their operations are applied to solve a variety of problems. You used algebra tiles, pencil-and-paper methods, and your calculator to work with integers.



One use of integers is to represent elevations above or below sea level. The height of Mount Everest is 8850 m above sea level. The Dead Sea is 400 m below sea level. How would you use integers to determine the difference in elevation between Mount Everest and the Dead Sea?



SECTION 2

Decimals

What does Canadian money have in common with the metric system? They are both decimal systems based on powers of 10. The sum of the money in the picture above is $11.11. The sum can also be represented as 111.1 dimes or 1111¢. Converting from one representation to another is a simple matter of changing the position of the decimal point!

In this section you will work with decimal numbers. You will review the procedures for adding, subtracting, multiplying, and dividing decimal numbers. As well, you will develop your estimation skills. Throughout this section you will apply your knowledge to solve a variety of problems.

LESSON 1

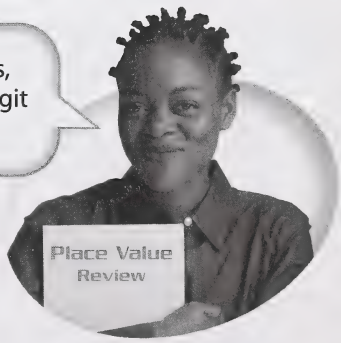
Rounding

Today you will review the procedures for rounding decimals.

Have you ever checked the weight of a chocolate bar? The chocolate bar may be labelled as weighing 60 g, but, if you weighed it on a scale, it would probably be 60.3 g or 59.8 g or some other value close to 60 g. However, you certainly would be disappointed if it only weighed 53.3 g, since 53.3 g is closer to 50 g than 60 g.

Have you ever wondered what is done to ensure that labels on food items are accurate? Labels on food items are rounded values. It would be impossible to make every chocolate bar exactly 60 g or every container of milk precisely 1 L or every box of cereal exactly 500 g!

Before you look at the rules for rounding decimals, you will need to review **place value**—what each digit in a number represents.



Looking Back

Our Hindu-Arabic number system is a decimal-number system based on powers of 10. Remember, the decimal point in a number separates the ones from the tenths **place holder**.

Example

Identify the place holders in 30 356.372. Then, write this number using expanded form.

ten thousands	thousands	hundreds	tens	ones	tenths	hundredths	thousandths
3	0	3	5	6	3	7	2

In expanded form, the place value of each digit is indicated.

$$\begin{aligned} 30\,356.372 &= (3\times 10\,000)+(0\times 1000)+(3\times 100)+(5\times 10)+(6\times 1) \\ &\quad +(3\times 0.1)+(7\times 0.01)+(2\times 0.001) \\ &= (3\times 10^{4})+(0\times 10^{3})+(3\times 10^{2})+(5\times 10^{1})+(6\times 10^{0}) \\ &\quad +(3\times 10^{-1})+(7\times 10^{-2})+(2\times 10^{-3}) \end{aligned}$$

You will apply your knowledge of place value to round decimal numbers.

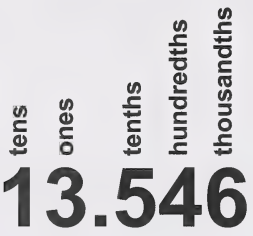
1. Turn to page 72 in your textbook. Work through Example 1. Then, complete "Investigation."

From your work in "Investigation," you discovered that to round a number to a particular place holder, look at the digit to the immediate right of the place holder you want to round to.

- If the digit on the right is less than 5, round down by simply dropping the digits on the right.
- If the digit on the right is 5 or greater, round up.

Example

Round 13.546 to the nearest ten, one, tenth, and hundredth.



To round to the nearest ten, look at the ones place holder. The ones place holder is 3. This digit is less than 5, so round down. Therefore, 13.546 rounded to the nearest ten is 10.

To round to the nearest whole number, look at the tenths place holder. The tenths place holder is 5, so round up. Therefore, 13.546 rounded to the nearest whole number is 14.

To round to the nearest tenth, look at the hundredths place holder. The hundredths place holder is 4, so round down. Therefore, 13.546 rounded to the nearest tenth is 13.5.

To round to the nearest hundredth, look at the thousandths place holder. The thousandths place holder is 6, so round up. Therefore, 13.546 rounded to the nearest hundredth is 13.55.

2. Turn to page 73 in your textbook. Do questions 4 to 6 of "Put into Practice."

3. Round each of the following numbers to the nearest tenth.

a. 5.746 **b.** 13.554 **c.** 123.476 **d.** 0.072 **e.** 3.049

4. Round each of the numbers in question 3 to the nearest hundredth.

Check your answers on page 90 in the Appendix.

Turn to the Section 2 Assignment in Assignment Booklet 1B. Answer questions 1 and 2.

LESSON 2

Adding and Subtracting Decimals

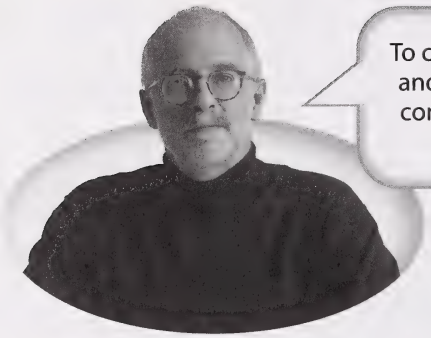
Today you will explore the addition and subtraction of decimals.

BRYAN AND CHERRY ALEXANDER PHOTOGRAPHY

Anna lives in Iqaluit, Nunavut. Anna has just e-mailed her cousin, Matthew, in Inuvik, Northwest Territories. They are working together on a geography project about the North. Anna and Matthew have discovered that Nunavut is Canada's largest territory, accounting for 20.96% of Canada's total area. They also found out that the Northwest Territories ranks third in size among Canada's provinces and territories and is 13.48% of Canada's total area. Together, Nunavut and the Northwest Territories are $20.96\% + 13.48\%$ or 34.44% of Canada's total area. The difference between these percentages is $20.96\% - 13.48\%$ or 7.48%. This difference is larger than Alberta, which is 6.63% of the total Canadian area.

If you are interested in Canada's geography and have access to the Internet, you can find out more at the following website:

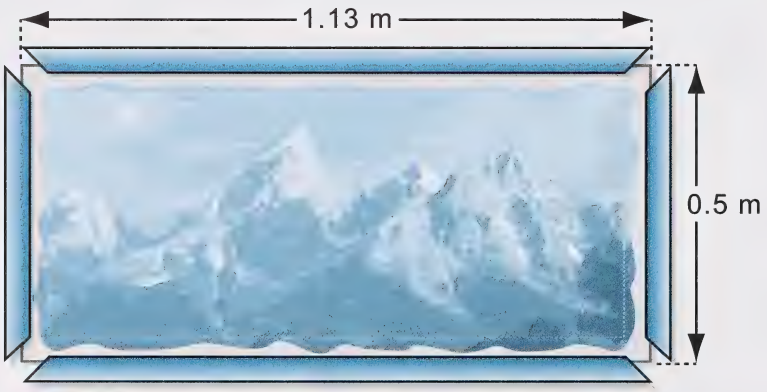
http://atlas.gc.ca/site/english/facts/surfareas.html



To complete their project, Matthew and Anna added and subtracted decimal numbers. There are several computational skills you need to master when you work with decimals.

Example

Jewel wants to frame a rectangular picture. By taking careful measurements, she has determined that she needs two pieces of frame that are 1.13 m long and two pieces that are 0.5 m long. She wonders if she can cut these four pieces from a 3.30-m length of frame. Can she do it?



Jewel first estimates the total length of the four pieces. She rounds 1.13 m to 1 m. So, two of these pieces would be about 2 m in length. She also knows that two pieces that are each 0.5 m long make 1 m in total. So, she needs a little over $2\text{ m} + 1\text{ m}$ or 3 m.

Now she needs to determine how much more than 3 m she needs. She knows that 1.13 m is 13 cm longer than 1 m. So, two pieces would be 2×13 cm or 26 cm more. Therefore, the total length of frame needed is 3 m and 26 cm or 3.26 m. She will be able to cut her frame from the 3.30-m length.

To check her mental calculations, she adds the lengths of the four pieces using pencil and paper. First, she writes down her measurements and lines up the decimals.

$$\begin{array}{r} 1.13\ \text{m} \\ 1.13\ \text{m} \\ 0.5\ \ \text{m} \\ +\ 0.5\ \ \text{m} \\ \hline \end{array}$$

She knows that 0.5 m is 50 cm or 0.50 m. So, she changes 0.5 to 0.50 so that there will be two decimal places in each number. Then she adds.

$$\begin{array}{r} 1.13\ \text{m} \\ 1.13\ \text{m} \\ 0.50\ \text{m} \\ +\ 0.50\ \text{m} \\ \hline 3.26\ \text{m} \end{array}$$

Jewel could also change each of her measurements to centimetres first.

$1.13\ \text{m} = 113\ \text{cm}$ and $0.5\ \text{m} = 50\ \text{cm}$.

$$\begin{array}{r} 113\ \text{cm} \\ 113\ \text{cm} \\ 50\ \text{cm} \\ +\ 50\ \text{cm} \\ \hline 326\ \text{cm} \end{array}$$

Then, she could change this sum to metres.

$326\ \text{cm} = 3.26\ \text{m}$

Therefore, Jewel can cut the four pieces of frame from the 3.30-m length.

She would have about 0.04 m or 4 cm left over.

$$\begin{array}{r} 3.30\ \text{m} \\ -\ 3.26\ \text{m} \\ \hline 0.04\ \text{m} \end{array} \quad \text{or} \quad \begin{array}{r} 330\ \text{cm} \\ -\ 326\ \text{cm} \\ \hline 4\ \text{cm} \end{array}$$

How would you have solved Jewel's problem?

Adding or subtracting metres and centimetres is similar to adding or subtracting dollars and cents. Turn to page 74 in your textbook. Work through Examples 1 and 2.

1. Turn to pages 74 and 75 in your textbook. Do questions 1.a., 1.c., 2.a., 2.c., 3, and 4 of "Put into Practice."

Check your answers on pages 90 to 92 in the Appendix.

Example

Add 3.87 and 2.38.

First, estimate the answer. Round each number to the nearest whole number.

3.87 rounds to 4.
2.38 rounds to 2.

The answer should be close to $4 + 2 = 6$.

Next, do the calculation.

$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 3.87 \\ +\ 2.38 \\ \hline 6.25 \end{array}$$

Did you use the following steps?

Step 1: Add the digits in the hundredths place holders.

$7 \text{ hundredths} + 8 \text{ hundredths} = 15 \text{ hundredths}$

15 hundredths is 10 hundredths and 5 hundredths.
10 hundredths is 1 tenth.

Write 5 in the hundredths place holder in the answer. Write a small 1 above the 8 in the tenths place holder.

$$\begin{array}{r} {\scriptstyle 1} \\ 3.87 \\ +\ 2.38 \\ \hline 5 \end{array}$$

Step 2: Add the digits in the tenths place holders.

$1 \text{ tenth} + 8 \text{ tenths} + 3 \text{ tenths} = 12 \text{ tenths}$

12 tenths is 10 tenths and 2 tenths.
10 tenths is 1 one.

Write 2 in the tenths place holder in the answer. Write a small 1 above the 3 in the ones place holder.

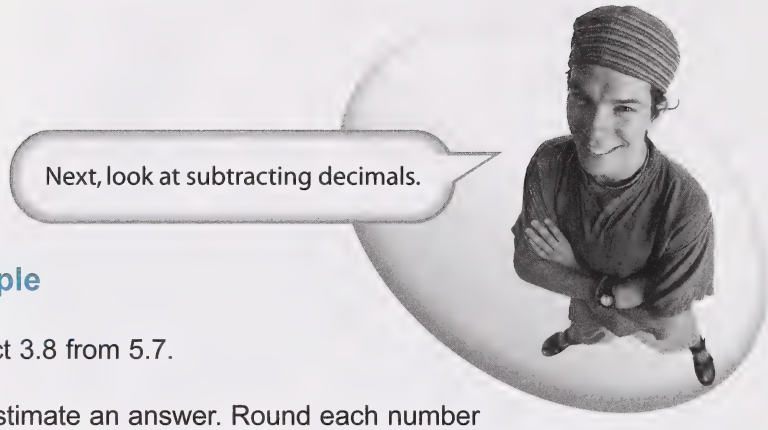
$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 3.87 \\ +\ 2.38 \\ \hline .25 \end{array}$$

Step 3: Add the ones.

$1 + 3 + 2 = 6$

$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 3.87 \\ +\ 2.38 \\ \hline 6.25 \end{array}$$

The answer 6.25 is reasonable. It is close to the estimate of 6.



Example

Subtract 3.8 from 5.7.

First, estimate an answer. Round each number to the nearest whole number.

3.8 rounds to 4.
5.7 rounds to 6.

The answer should be close to $6 - 4 = 2$.

Next, do the calculation.

$$\begin{array}{r} {}^{4}\,{}^{17} \\ 5.\cancel{7} \\ -\ 3.8 \\ \hline 1.9 \end{array}$$

Did you use the following steps?

Step 1: Subtract the tenths.

You cannot subtract 8 tenths from 7 tenths, so you must trade 1 one for 10 tenths. Cross out the 5 and write a 4 above the 5, since you traded 1 one. Write a 1 next to the 7 to indicate 10 tenths + 7 tenths = 17 tenths.

So, 17 tenths − 8 tenths = 9 tenths. Write a 9 in the tenths place holder in the answer.

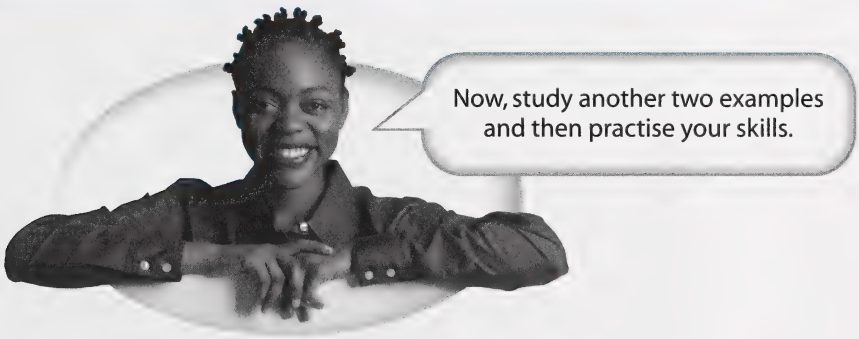
$$\begin{array}{r} {}^{4}\,{}^{17} \\ 5.\cancel{7} \\ -\ 3.8 \\ \hline 9 \end{array}$$

Step 2: Subtract the ones.

$4 - 3 = 1$

$$\begin{array}{r} {}^{4}\cancel{5}.{}^{17}\cancel{7} \\ -\ 3.8 \\ \hline 1.9 \end{array}$$

The answer is 1.9. The answer is reasonable since it is close to the estimate of 2.



Turn to page 76 in your textbook. Work through Example 1.

2. Turn to page 77 in your textbook. Complete "Investigation."

3. Turn to pages 77 to 79 in your textbook. Do questions 1.j., 1.l., 2.a., 2.c., 2.d., 2.e., 3.c., 3.e., 3.g., 3.j., 3.l., and 4 of "Put into Practice."

Check your answers on pages 92 to 96 in the Appendix.

Turn to the Section 2 Assignment in Assignment Booklet 1B. Answer questions 3 to 5.

LESSON 3

Multiplying Decimals

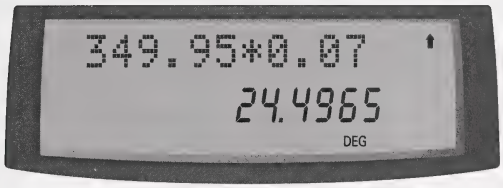
Today you will explore multiplying decimal numbers.

Carla wants to buy a digital camera that is advertised in a sale flyer for $349.95. She knows she will also have to pay 7% GST. To calculate the GST, Carla must multiply $349.95 by 0.07.

$$\text{GST} = \$349.95 \times 0.07$$

Many situations, such as paying taxes, receiving sales discounts, earning interest on money invested in savings accounts, and determining areas and volumes, involve multiplying decimals.

You can use your calculator to determine Carla's GST. Press the following keys.

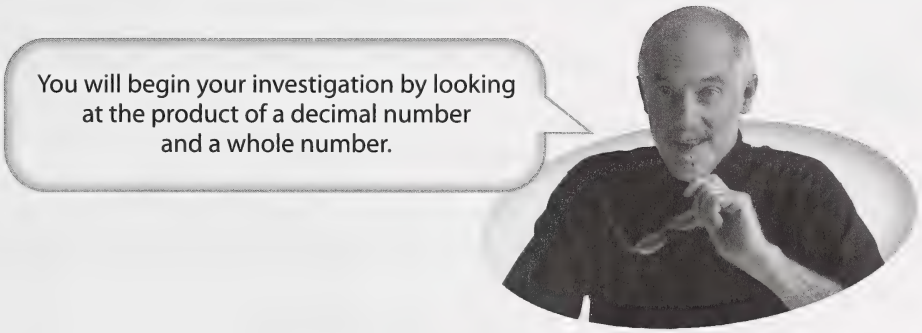


The product is $24.4965. There are four decimal places in the product. You must round your answer to the nearest cent.

$24.4965 rounds to $24.50.

Carla would have to pay $24.50 in GST.

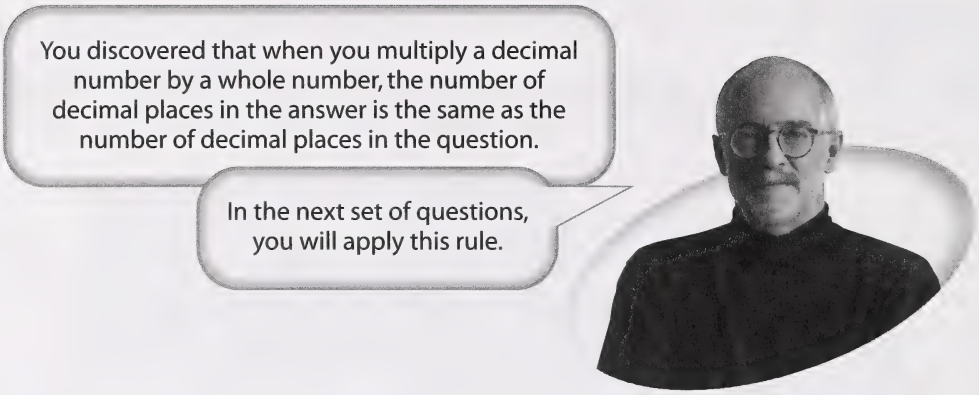
Do you know why the calculator gave you an answer with four decimal places?



Turn to page 82 in your textbook. Work through Examples 1 to 3.

1. Turn to pages 82 and 83 in your textbook. Do questions 1 to 3 of "Investigation."

Check your answers on page 97 in the Appendix.



Turn to page 83 in your textbook. Work through Example 4.

2. Turn to page 84 in your textbook. Do questions 1 to 5 of "Put into Practice."

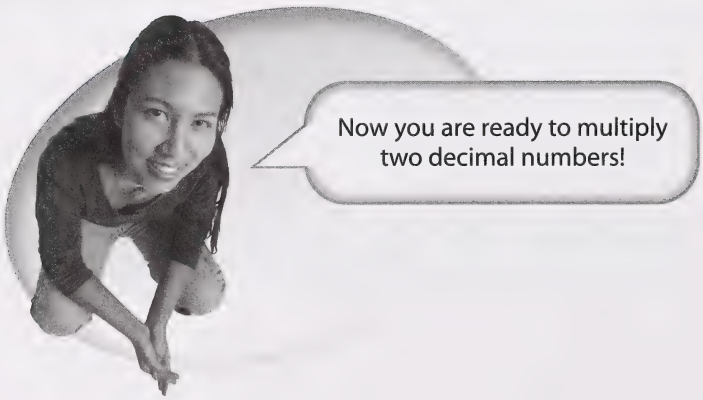
Check your answers on pages 97 to 100 in the Appendix.

To develop the rule for multiplying two or more decimal numbers, first you will need to investigate the rules for multiplying a decimal number by powers of 10.

3. Turn to page 85 in your textbook. Do questions 1 to 3 of "Investigation."

4. Turn to page 86 in your textbook. Work through Examples 1 and 2 and then do questions 1 to 4 of "Put into Practice."

Check your answers on pages 101 and 102 in the Appendix.



Example

Multiply 3.12 by 1.4.

Method 1: Use Powers of 10

Rewrite 3.12 as 312×0.01. Remember, multiplying by 0.01 moves the decimal two places to the left.

Next, rewrite 1.4 as 14×0.1. Remember, multiplying by 0.1 moves the decimal one place to the left

$$\begin{aligned} 3.12 \times 1.4 &= 312 \times 0.01 \times 14 \times 0.1 \\ &= 312 \times 14 \times 0.01 \times 0.1 \end{aligned}$$

To complete this calculation, begin by multiplying the whole numbers.

$$\begin{array}{r} 312 \\ \times\ 14 \\ \hline 1248 \\ +\ 3120 \\ \hline 4368 \end{array}$$

← Multiply 312 by 4.

← Multiply 312 by 10.

Next, multiply 4368 by 0.01×0.1.

Multiply by 0.01.

$4368 \times 0.01 = 43.68$ Remember, multiplying by 0.01 moves the decimal two places to the left.

Multiply by 0.1.

$43.68 \times 0.1 = 4.368$ Remember, multiplying by 0.1 moves the decimal one place to the left.

In total, the decimal was moved three places to the left! Notice that there were two decimal places in 3.12 and one decimal place in 1.4.

Therefore, $3.12 \times 1.4 = 4.368$.

Method 2: Use an Estimate

Begin by rounding.

3.12 rounds to 3.
1.4 rounds to 1.

The estimate is $3 \times 1 = 3$.

Multiply as in Method 1. Use your estimate of 3 to place the decimal.

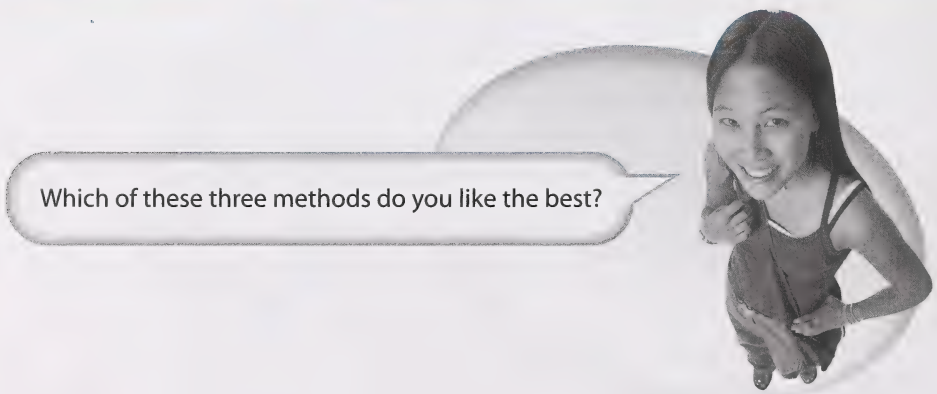
$$\begin{array}{r} 3.12 \\ \times\ 1.4 \\ \hline 1248 \\ +\ 3120 \\ \hline 4.368 \end{array}$$

← Multiply 312 by 4.
← Multiply 312 by 10.
← Insert the decimal. The decimal has to go between the 4 and the 3 since 4.368 is closest to your estimate.

Method 3: Total the Decimal Places in the Numbers Being Multiplied

$$\begin{array}{r} 3.12 \\ \times\ 1.4 \\ \hline 1248 \\ +\ 3120 \\ \hline 4.368 \end{array}$$

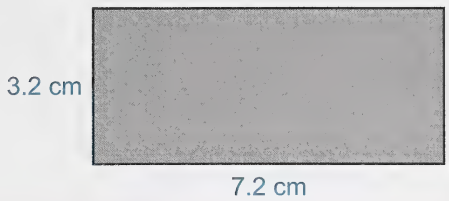
← There are two decimal places.
← There is one decimal place.
← Multiply 312 by 4.
← Multiply 312 by 10.
← Insert the decimal. There are $2 + 1 = 3$ decimal places.



5. Find each product using the three methods shown in the previous example.

a. 4.12×6.34 **b.** 6.123×12.3

6. Find the area of this rectangle.

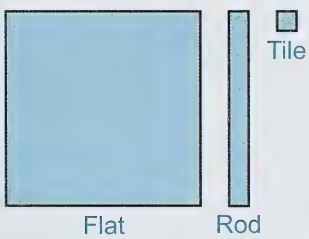


Check your answers on pages 102 to 105 in the Appendix.

Do you remember using base ten blocks in your previous math courses to multiply decimals?

Looking Back

If you do not have base ten blocks, you can draw them on grid paper. Base ten blocks have flats, rods, and small tiles.



You will use a flat to represent 1.

Because 10 rods can be used to cover 1 flat, 1 rod represents 0.1.

Because 100 tiles can be used to cover 1 flat, 1 tile represents 0.01.

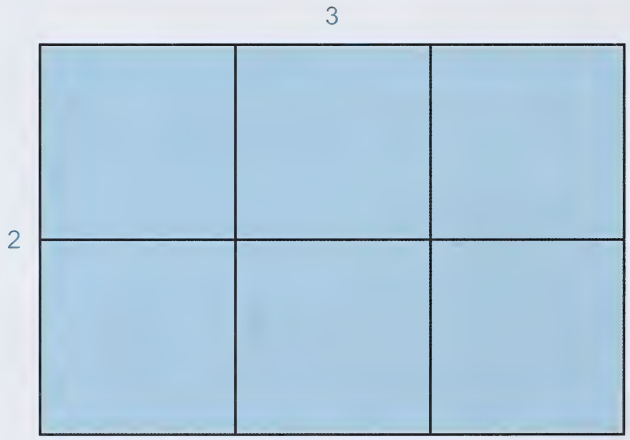
The following base ten blocks represent $(2\times1)+(3\times0.1)+(4\times0.01)=2.34$.

How would you use these tiles to multiply?

Example

Multiply 3 by 2.

The product 3×2 can be thought of the area of a large rectangle that is 3 flats long and 2 flats wide.



There are 6 flats altogether. So, $3\times2=6$.

This principle can be extended to decimals.

Example

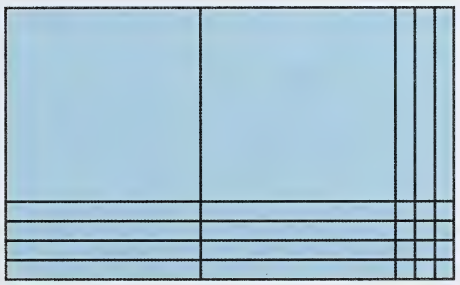
Multiply 2.3 by 1.4.

You will find the area of a rectangle that is 2.3 units long and 1.4 units wide. Start by using base ten blocks to form the sides of the rectangle.

2.3 is 2 flats and 3 rods.

1.4 is 1 flat and 4 rods.

Next, fill in the missing parts to complete the rectangle.



The total area is $2 \text{ flats} + 11 \text{ rods} + 12 \text{ tiles}$.

You can regroup 10 of the 12 tiles and replace them with 1 rod.

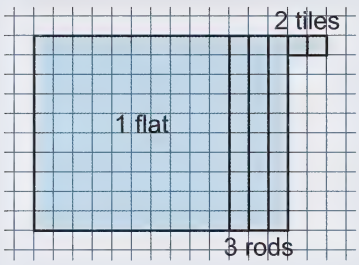
You can regroup 10 of the 11 rods and replace them with 1 flat.

Therefore,

$$\begin{aligned} 2.3 \times 1.4 &= 2 \text{ flats} + 11 \text{ rods} + 12 \text{ tiles} \\ &= 2 \text{ flats} + (10 \text{ rods} + 1 \text{ rod}) + (10 \text{ tiles} + 2 \text{ tiles}) \\ &= 2 \text{ flats} + (1 \text{ flat} + 1 \text{ rod}) + (1 \text{ rod} + 2 \text{ tiles}) \\ &= 3 \text{ flats} + 2 \text{ rods} + 2 \text{ tiles} \\ &= 3.22 \end{aligned}$$

You can check this product on your calculator. Notice, there are two decimal places in the answer, and there was one decimal place in 2.3 and one decimal place in 1.4.

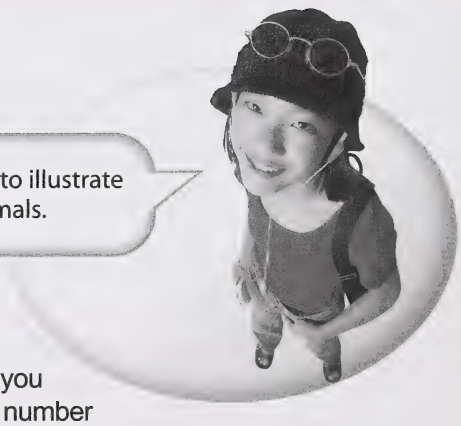
7. Use base ten blocks to find each product. If you don't have base ten blocks, draw diagrams using the grid paper in the Appendix. Draw flats as 10×10 squares, rods as 1×10 rectangles, and the small tiles as 1×1 squares. For example, 1 flat, 3 rods, and 2 tiles are shown on the grid.



a. 3.2×2.4

b. 1.2×1.5

Check your answers on pages 105 and 106 in the Appendix.



In Looking Back, you used base ten blocks to illustrate the procedure for multiplying decimals.

To determine the number of decimal places in a product, count the total number of decimal places in the factors. For example, if you multiply a number with 3 decimal places by a number with 4 decimal places, there will be $3 + 4 = 7$ decimal places in the product.

Turn to pages 87 and 88 in your textbook. Work through Examples 1 and 2. Read the summary in the middle of page 87 and complete "Investigation."

8. Turn to pages 88 and 89 in your textbook. Do questions 1, 2, 4, 5, 6, and 7.a. of "Put into Practice."

Check your answers on pages 106 and 107 in the Appendix.

Turn to the Section 2 Assignment in Assignment Booklet 1B. Answer questions 6 to 9.

LESSON 4

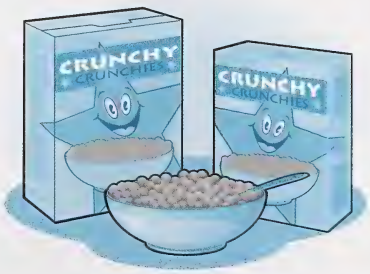
Dividing Decimals

Today you will investigate the division of decimals.

Jason's favourite breakfast cereal comes in two sizes: 350 g and 500 g. The 350-g size sells for \$3.00 and the 500-g size sells for \$4.19. Which size is the better buy? To compare prices, Jason calculates the cost, in cents, of 100 g for each size.

For the 350-g box, Jason uses his calculator to divide \$3.00, or 300¢, by 3.5 (because $3.5 \times 100\ \text{g} = 350\ \text{g}$).

$$300¢ \div 3.5 = 85.71¢ \text{ per } 100\ \text{g}$$



For the 500-g box, Jason divides \$4.19, or 419¢, by 5 (because $5 \times 100\ \text{g} = 500\ \text{g}$).

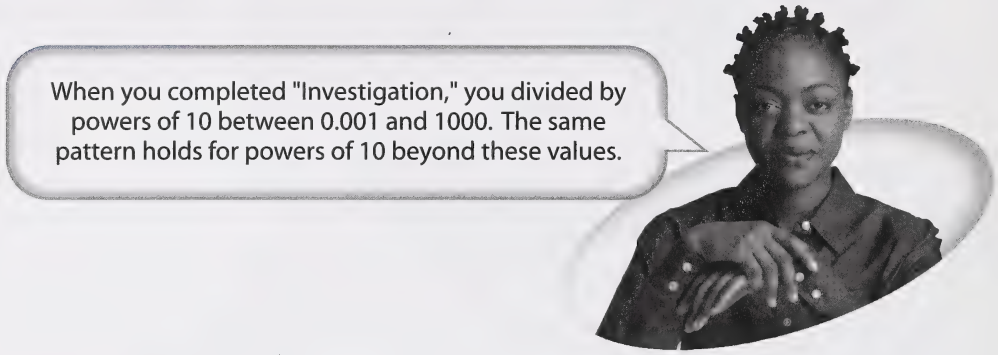
$$419¢ \div 5 = 83.8¢ \text{ per } 100\ \text{g}$$

Therefore, the 500-g size is the better buy!

Comparison shopping is just one example of where the division of decimals is used to solve everyday problems. Before you look at general problems, you will explore division by powers of 10.

1. Turn to page 90 in your textbook. Do questions 1 to 3 of "Investigation."

Check your answers on page 107 in the Appendix.



Example

Divide 32.12 by 10 000.

There are four zeros in 10 000. Therefore, when you divide by 10 000, you must move the decimal point in the number being divided four places to the left.

Therefore, $32.12 \div 10\,000 = 0.003\,212$.

$0.003\,212$

4 places to the left

Example

Divide 32.12 by 0.000 01.

There are five decimal places in 0.000 01. Therefore, when you divide by 0.000 01, you must move the decimal point in the number being divided five places to the right.

Therefore, $32.12 \div 0.000\,01 = 3\,212\,000$.

$3\,212\,000$

5 decimal places

Turn to page 91 in your textbook. Work through Examples 1 and 2.

2. Turn to pages 91 and 92 in your textbook. Do questions 1 to 8 of "Put into Practice."

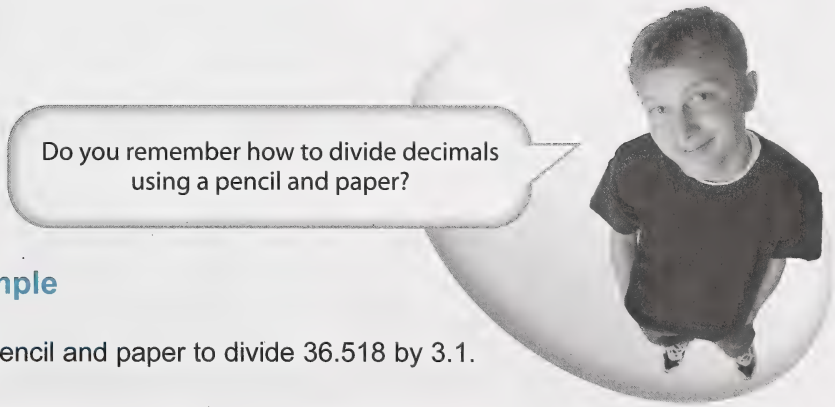
Check your answers on page 108 in the Appendix.

Example

Liana used pencil and paper to divide 36.518 by 3.1.
She wrote her answer as 117.8. Is her answer reasonable?

Estimate the answer. The divisor 3.1 rounds to 3. Remember, a divisor is a number by which you are dividing. Round the dividend 36.518 to 36 because 36 is divisible by 3. Remember, a dividend is the number which you are dividing.

Since $36 \div 3 = 12$, Liana's answer of 117.8 is not reasonable. What should her quotient be? Remember, a quotient is the answer to a division question.



Example

Use pencil and paper to divide 36.518 by 3.1.

Division will be easier if you change the divisor 3.1 to a whole number. This can be done by multiplying by 10.

The question can be written as follows:

$$36.518 \div 3.1 = \frac{36.518}{3.1}$$

$$= \frac{36.518 \times 10}{3.1 \times 10}$$ ← Multiply the top and bottom of the fraction by 10. Multiplying 3.1 by 10 changes the divisor to the whole number 31.

$$= \frac{365.18}{31}$$

You will obtain the same answer by dividing 365.18 by 31.

Original Question

$3.1\overline{)36.518}$

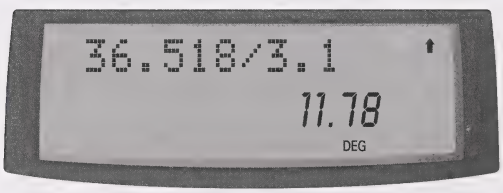
Divisor Dividend

Equivalent Question

$$\begin{array}{r} 11.78 \\ 31.\overline{)365.18} \\ 31 \\ \hline 55 \\ 31 \\ \hline 24\,1 \\ 21\,7 \\ \hline 2\,48 \\ 2\,48 \\ \hline 0 \end{array}$$

Use your calculator to check your answer.

Press the following keys on your calculator.



Therefore, $36.518 \div 3.1 = 11.78$.

Now, it's time for you to practise your division skills.

Turn to page 93 in your textbook. Work through Example 1.

3. Turn to page 94 in your textbook. Do questions 1 and 3 of "Put into Practice."

Check your answers on pages 108 and 109 in the Appendix.

Next, you will divide decimals to solve problems.

Turn to page 94 in your textbook. Work through Example 2.

4. Turn to pages 94 and 95 in your textbook. Do questions 4 to 10 of "Put into Practice."

Check your answers on pages 110 to 112 in the Appendix.

Turn to the Section 2 Assignment in Assignment Booklet 1B. Answer questions 10 to 13.

CONCLUSION

In this section you explored a variety of everyday problems involving decimals. In your exploration you reviewed the operations of addition, subtraction, multiplication, and division. You used base ten blocks and your calculator to develop and illustrate the procedures you applied.

Decimals are used in measurements you make and to represent the money you spend. For example, Janice's new sedan consumes fuel at a rate of 6.2 L/100 km. She is planning to drive to Sarnia, Ontario. She estimates the return trip is 6300 km. If gas averages 72.9¢/L, approximately how much would she spend on gas?

MODULE SUMMARY

In this module you explored integers and decimals and the operations involving these numbers. In your exploration you used algebra tiles, base ten blocks, and your calculator to develop and illustrate the procedures you applied.

Erin is in her last year of high school and is the captain of her school hockey team. This fall she plans to attend college to pursue her education and try out for the college hockey team.

What are your plans for your future? After you complete your education, what career will you choose? Where will you live? What will your income and expenses be? These are just a few of the issues you must consider before you become independent. Managing your financial affairs is an important aspect of independence. To manage your finances, you must be able to apply integers and decimals.

Turn to Assignment Booklet 1B and complete the Final Module Assignment.

When you are done, submit Assignment Booklet 1B to your teacher to be marked.

REVIEW

This Review will help you apply what you learned in Module 1 and prepare for the Final Test. Read over the skills checklist for this module. Use this list to guide your study and to help you decide how much of the Review you should complete.

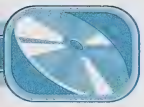
Skills Checklist

Integers

- ❑ Apply order of operations to solve problems using pencil and paper or a calculator.
- ❑ Demonstrate an understanding of integers and use arithmetic operations to solve problems involving integers.

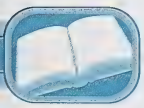
Decimals

- ❑ Demonstrate an understanding of and proficiency with adding, subtracting, multiplying, and dividing decimals.
- ❑ Use estimation strategies to check the reasonableness of calculations.



If you need additional work to master the material in this module, work through the following lessons on the CD-ROM that accompanies your textbook:

- "Lesson 1: Order of Operations"
- "Lesson 2: Integers—Add and Subtract"
- "Lesson 3: Integers—Multiply and Divide"



1. Turn to page 64 in your textbook. Do questions 1 to 3 of "Order of Operations."
2. Turn to page 68 in your textbook. Do questions 12 to 16 of "Integers."
3. Use algebra tiles to perform each of the following operations.

   a. $(+4)+(-7)$ **b.** $(-3)+(+4)$

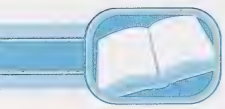
   c. $(-3)-(+2)$ **d.** $(-4)-(-6)$

4. Use a number line to calculate each of the following.

   a. $4+(-5)$ **b.** $(-2)+(+4)$

5. What is the opposite of -8?

6. What are the rules for multiplying and dividing integers?



7. Turn to pages 113 and 114 in your textbook. Do questions 1 to 9 of "Decimals."

8. Explain how you would use base ten blocks to multiply 3.2 by 2.1. Use a diagram to support your answer.

9. Find each product.

   a. 4.34×0.001 **b.** $0.046 \times 10\ 000$

10. Find each quotient.

    a. $4.34 \div 0.001$ **b.** $0.046 \div 10\ 000$

Check your answers on pages 112 to 119 in the Appendix.

MATHEMATICS 14

Appendix

GLOSSARY
ANSWER KEY
IMAGE CREDITS
LEARNING AIDS

Glossary

difference: the answer to a subtraction question

dividend: the number being divided

divisor: the number doing the dividing

even number: an integer that is divisible by 2

factor: one of two or more numbers multiplied together

integers: positive and negative whole numbers

inverse operations: operations that undo each other

For example, the inverse operation of multiplying by 2 is dividing by 2.

negative: less than zero

odd number: an integer that is not divisible by 2

order of operations: the order in which operations must be performed in arithmetic expressions

place holder: the position of a digit in a number that determines its value

For example, 4 in 14 is in the ones place.

place value: the value of a place holder in a decimal number

positive: greater than zero

product: the answer to a multiplication question

quotient: the answer to a division question

sum: the answer to an addition question

Zero Principle: the zero sum of an integer and its opposite

Answer Key

Section 1: Integers

Lesson 1: Order of Operations

1. Textbook, page 7, "Put into Practice," questions 1 and 2

1. a. Original Answer

$$4\times2+3\times6=4\times5\times6$$
$$=20\times6$$
$$=120$$

← The error occurs here. You must multiply first and then add.

Correct Answer

$$(4\times2)+(3\times6)=8+18$$
$$=26$$

b. Original Answer **Correct Answer**

$30-5\times3=25\times3$ ← The error occurs here. You must multiply first and then subtract. $30-(5\times3)=30-15$

$=75$ $=15$

2. a. $(43+7)\times2=100$

$50\times2=100$

b. $(8+9)-(2+4)=11$

$17-6=11$

2. a. $3^2-2\times3+4(2+3)=3^2-2\times3+4(5)$ Brackets first.

$=9-2\times3+4(5)$ Exponents next.

$=9-6+20$ Multiply.

$=23$ Add and subtract.

b. $4(2\times3-6)+3\times4\div2=4(6-6)+3\times4\div2$ } Brackets first.

$=4(0)+3\times4\div2$

$=0+12\div2$ } Multiply and divide.

$=0+6$

$=6$ Add.

3. Textbook, pages 7 and 8, "Put into Practice," question 3 and questions 5 to 10

3. $\$25+(3\times\$65)=\$25+\$195$

$=\$220$

The total bill will be $220.

5. $\$5.99+(190\times\$0.07)+(90\times\$0.07)=\$5.99+\$13.30+\$6.30$

$=\$25.59$

The total bill will be $25.59.

6. $(3\times\$3.65)+(2\times\$4.79)+(3\times\$5.24)+(5\times\$1.25)+(3\times\$1.75)+(8\times\$1.00)$

$=\$10.95+\$9.58+\$15.72+\$6.25+\$5.25+\$8.00$

$=\$55.75$

7. $(6\times3)-8=18-8$

$=10$

8. $(3+6)\times 5 = 9\times 5$

$= 45$

9. $\$50.00 - (2\times \$23.95) = \$50.00 - \$47.90$

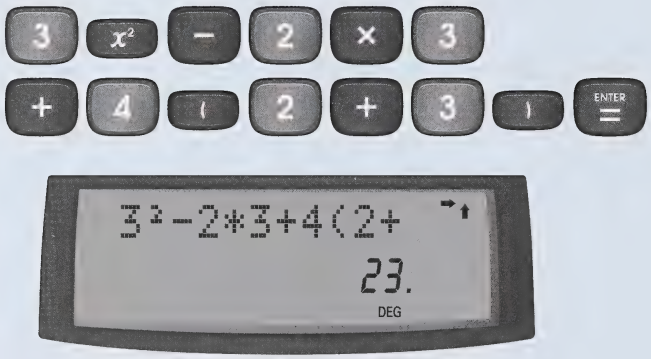
$= \$2.10$

10. $15+(3\times 6)-10 = 15+18-10$

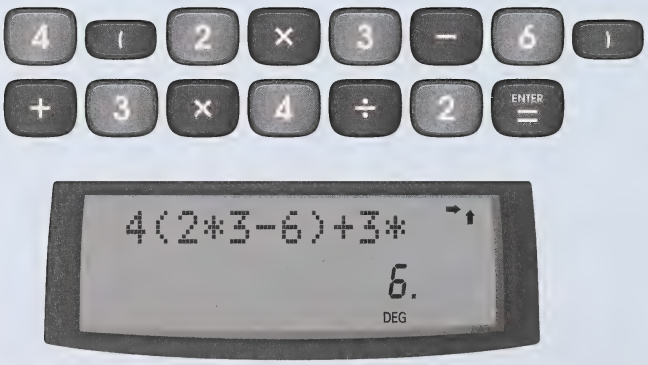
$= 33-10$

$= 23$

4. a. Press the following keys on your calculator.



b. Press the following keys on your calculator.



Lesson 2: Integers

1. Textbook, page 10, "Put into Practice," questions 1 to 3

1. a. +3 **b.** −10 **c.** +70 **d.** +6
e. −2 **f.** +500 **g.** +3 **h.** 0

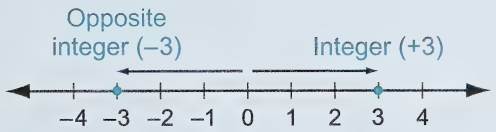
2. a. 7 strokes below par
b. 1 stroke below par
c. 4 strokes above par
d. 9 strokes above par
e. at par
f. 3 strokes below par
g. 8 strokes above par
h. 2 strokes below par

3. a. −4 **b.** +3
c. +18 **d.** −10

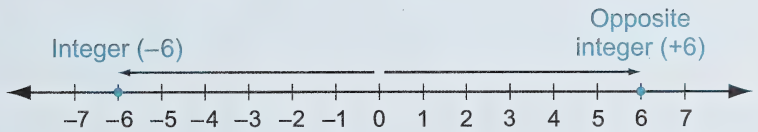
2. Textbook, page 10, "Put into Practice," questions 4.a., 5.a., and 5.b.

4. a. Location A is −3.
Location B is 0.
Location C is 4.

5. a.

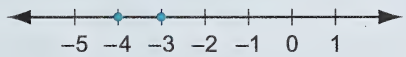


b.



3. Textbook, pages 11 and 12, "Put into Practice," questions 1.b., 2.b., 2.c., 3.a., 4.a., 5, 6.a., 7.b., 8, 9, 10, 11, and 12

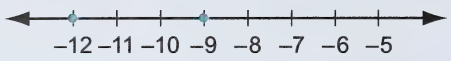
1. b.



−3 is farther to the right than −4 on a number line.

2. b.

−5 is farther to the left than −3 on a number line.

2. c. 

-12 is farther to the left than -9 on a number line.

3. a. -3 is greater than -5. This is written as $-3 > -5$.

4. a. -4 is smaller than -2. This is written as $-4 < -2$.

5. a. -2 is the largest. -7 is the smallest.

b. $+2$ is the largest. -3 is the smallest.

c. $+3$ is the largest. -3000 is the smallest.

6. a. $+9 > +7 > -2 > -3$

7. b. $-6 < -4 < -3 < -2$

8. a. $-8 < +1$

b. $-4 > -7$

c. $-12 < +1$

d. $+3 > +1$

9. a. False. $+6$ is greater than $+4$.

b. True.

c. False. $+2$ is greater than $+1$.

d. False. -10 is less than -4.

e. False. -2 is less than 0.

f. False. $+1$ is greater than 0.

10. a. Neon has the lowest freezing point.

b. $-249°C < -210°C < -71°C < -39°C < 0°C$

11. a. Wellington (NZ) is the warmest place today.

b. Winnipeg is the coldest place today.

c. The cities from coldest to warmest are Winnipeg, Montreal, Calgary, Moscow, Vancouver, London (England), Hong Kong, and Wellington (NZ).

d. Your answer will depend on whether you prefer cold or warm weather.

12. The integers -2, 1, and 0 are less than $+3$ but greater than -4.

Lesson 3: Adding Integers

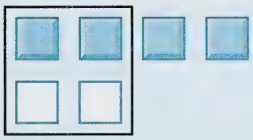
1. **Textbook, page 14, "Put into Practice," questions 2 and 3**

   2. Any integer that is to the left of or below another integer on a number line is smaller than that integer.

   3. Any integer that is to the right of or above another integer on a number line is larger than that integer.

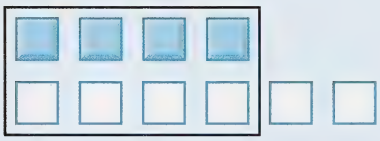
2. **Textbook, page 15, "Put into Practice," questions 1, 2.a., 2.b., 3.d., 4.b., 4.d., and 6**

   1. **a.** 4 reds and 2 whites



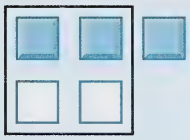
Therefore, $+4+(-2)=+2$.

b. 4 reds and 6 whites



Therefore, $+4+(-6)=-2$.

c. 3 reds and 2 whites



Therefore, $+3+(-2)=+1$.

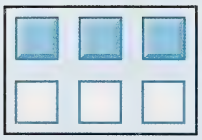
d. 2 reds and 5 whites

Therefore, $+2+(-5)=-3$.

e. 3 reds and 1 white

Therefore, $+3+(-1)=+2$.

f. 3 reds and 3 whites

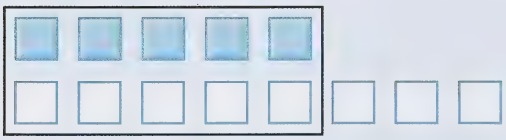


Therefore, $+3+(-3)=0$.

2. a. $+2+(-3)=-1$ **b.** $-4+(+3)=-1$

3. d. $-2+(-1)=-3$

4. b. Represent $5+(-8)$ with 5 reds and 8 whites.



Therefore, $5+(-8)=-3$.

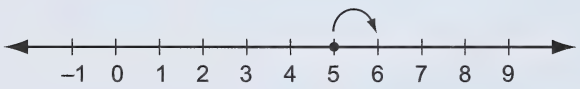
d. Represent $5+3$ with 5 reds and 3 reds.

Therefore, $+5+(+3)=+8$.

6. a. $+3$ **b.** -15 **c.** $+4$ **d.** -12
e. $+8$ **f.** -5 **g.** 0 **h.** $+2$
i. -10 **j.** 10 **k.** -110 **l.** $+6$

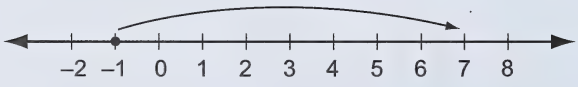
3. Textbook, pages 16 to 18, "Put into Practice," questions 2, 4, 6, and 8

2. a.



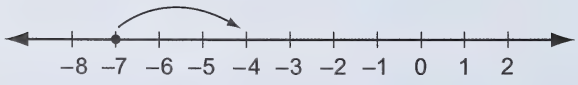
$(+5)+(+1)=+6$

b.



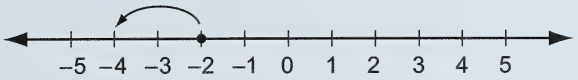
$(-1)+(+8)=+7$

c.



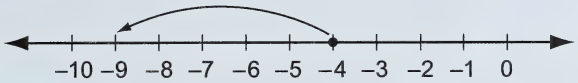
$(-7)+(+3)=-4$

d.



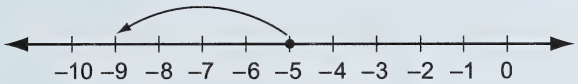
$(-2)+(-2)=-4$

e.



$(-4)+(-5)=-9$

f.



$(-5)+(-4)=-9$

4. a. To add two positive numbers, simply add them as though they were two whole numbers. The sign of the answer is positive.

For example, $(+2)+(+3)=+5$.

b. To add two negative numbers, add them as though they were two whole numbers. The sign of the answer is negative.

For example, $(-2)+(-3)=-5$.

c. To add a positive number and a negative number, first think of them as whole numbers. Subtract the smaller whole number from the larger whole number. Then, use the sign of the integer that gave you the larger whole number.

For example, $(-9)+(+2)$. Think of 9 and 2. Subtract.

$9-2=7$

Because -9 gave you the larger whole number, the answer will be negative.

Therefore, $(-9)+(+2)=-7$.

6. a. $0+(-3)+(-2)=(-3)+(-2)$
$=-5$

The temperature is $-5°C$.

b. $0+(+5)+(-8)=(+5)+(-8)$
$=-3$

The temperature is $-3°C$.

c. $(-225)+(-175)=-400$

The total reduction was 400 kbytes.

d. $(-45\,000)+(+75\,000)=+30\,000$

The profit was $30 000.

e. $(+70)+(-30)=+40$

The final effect on the average attendance was an increase of 40.

8. a. $(-3)+(+3)+(+11)=0+(+11)$ ← -3 and $+3$ are opposites.
$=+11$

b. $+1+(-5)+(+4)+(-6)=(+5)+(-11)$ ← Add the positive integers and the negative integers together first.
$=-6$

c. $+7+(-4)+(+6)=(+13)+(-4)$ ← Add the positive integers first.
$=+9$

d. $+8+(-6)+(-4)=(+8)+(-10)$ ← Add the negative integers first.
$=-2$

e. $+1+(+2)+(-6)=(+3)+(-6)$ ← Add the positive integers first.
$=-3$

f. $+12+(-13)+(+7)=(+19)+(-13)$ ← Add the positive integers first.
$=+6$

g. $-9+(-5)+(-8)=-22$

h. $(1234)+(-5678)+(-1234)=(-5678)+0$ ← 1234 and -1234 are opposites.
$=-5678$

Lesson 4: Subtracting Integers

1. Textbook, page 21, "Put into Practice," questions 1, 2.a., 2.c., 2.e., 2.g., and 3

1. $(-6)-(+4)$

In order to subtract $+4$ (4 reds), you need to add 4 reds and 4 whites, which is zero, to -6.

Now you can take away 4 reds.

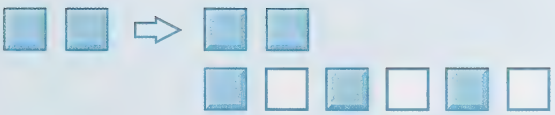
The result is -10. You get that by adding the 4 remaining whites and the 6 original whites.

Therefore, $(-6)-(+4)=(-6)+(-4)$

$=-10$

2. a. 2 reds subtract 5 reds

In order to take away 5 reds, you will need another 3 reds. Therefore, add 3 reds and 3 whites, which is zero, to the original 2 reds.



Now, take away the 5 reds.

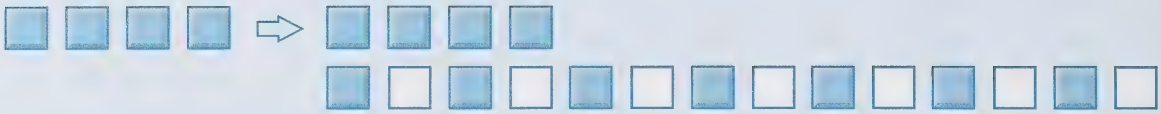
You can see the result is 3 whites.

Therefore, $(+2)-(+5)=(+2)+(-5)$

$=-3$

c. 4 reds subtract 7 whites

In order to take away 7 whites, you need 7 whites. Therefore, add 7 whites and 7 reds to the original 4 reds.



Now, take away the 7 whites.

You can see the result is 11 reds.

Therefore, $(+4)-(-7)=(+4)+(+7)$

$=+11$

e. 4 whites subtract 2 whites

Take away 2 whites.

The result is 2 whites.

Therefore, $(-4)-(-2)=(-4)+(+2)$

$=-2$

g. 6 reds subtract 2 reds

Take away 2 reds.

The result is 4 reds.

Therefore, $(+6)-(+2)=(+6)+(-2)$

$=+4$

3. **a.** $(+5)-(+2)=(+5)+(-2)$
$=+3$

b. $(-3)-(+6)=(-3)+(-6)$
$=-9$

c. $(-6)-(+7)=(-6)+(-7)$
$=-13$

d. $(+7)-(-9)=(+7)+(+9)$
$=+16$

e. $(+3)-(+8)=(+3)+(-8)$
$=-5$

f. $(-6)-(-1)=(-6)+(+1)$
$=-5$

g. $(-6)-(+6)=(-6)+(-6)$
$=-12$

h. $(+6)-(-6)=(+6)+(+6)$
$=+12$

i. $(-1.2)-(-1.2)=(-1.2)+(+1.2)$
$=0$

j. $0-(-2)=0+(+2)$
$=+2$

k. $(-4)-(-6)=(-4)+(+6)$
$=+2$

l. $(+7)-(-5)=(+7)+(+5)$
$=+12$

m. $(-9)-(+6)=(-9)+(-6)$
$=-15$

n. $0-(+2)=0+(-2)$
$=-2$

o. $0-2=0+(-2)$
$=-2$

2. Textbook, pages 21 and 22, "Put into Practice," questions 4 to 7

4. **a.** $(+8)-(-5)=(+8)+(+5)$
$=+13$

b. $(-3)-(-4)=(-3)+(+4)$
$=+1$

c. $(+6)-(-3)=(+6)+(+3)$
$=+9$

d. $(-7)-(+4)=(-7)+(-4)$
$=(-11)$

e. $(+5)-(-5)=(+5)+(+5)$
$=+10$

f. $(-9)-(+8)=(-9)+(-8)$
$=-17$

g. $(9)-(+8)=(9)+(-8)$
$=+1$

h. $(-9)-(-8)=(-9)+(+8)$
$=-1$

i. $(-109)-(-108)=(-109)+(+108)$
$=-1$

j. $(-8)-(+6)=(-8)+(-6)$
$=-14$

k. $0-(-3)=0+(+3)$
$=+3$

l. $(+8)-(+12)=(+8)+(-12)$
$=-4$

m. $(-4)-(-4)=(-4)+(+4)$
$=0$

n. $(+3)-(3)=(+3)+(-3)$
$=0$

o. $(1234)-(1234)=(1234)+(-1234)$
$=0$

5. a. $(+6)-(+2)=(+6)+(-2)$
$=+4$

b. $(-4)-(-3)=(-4)+(+3)$
$=-1$

c. $(-8)-(+2)=(-8)+(-2)$
$=-10$

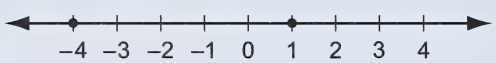
d. $(+8)-(+6)=(+8)+(-6)$
$=+2$

e. $(-3)-(-3)=(-3)+(+3)$
$=0$

f. $(-8)-(0)=-8+(0)$
$=-8$

6. When subtracting one integer from another, the answer will be negative if the number being subtracted lies to the right of the other number on the number line.

Example

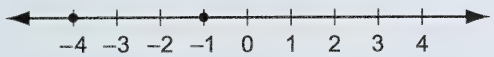


$+1$ lies to the right of -4.

$(-4)-(+1)=(-4)+(-1)$
$=-5$

When subtracting one integer from another, the answer will be positive if the number being subtracted lies to the left of the other number on the number line.

Example



-4 lies to the left of -1.

$$(-1)-(-4)=(-1)+(+4)$$
$$=+3$$

7. a. False. The result can be positive, negative, or zero.

$$(+6)-(+2)=(+6)+(-2)$$
$$=+4$$

$$(+2)-(+6)=(+2)+(-6)$$
$$=-4$$

$$(+2)-(+2)=(+2)+(-2)$$
$$=0$$

b. True.

c. False. When a negative number is subtracted from a positive integer, the result will always be positive.

$$(+6)-(-2)=(+6)+(+2)$$
$$=+8$$

d. False. The result can be positive, negative, or zero.

$$(-2)-(-6)=(-2)+(+6)$$
$$=+4$$

$$(-6)-(-2)=(-6)+(+2)$$
$$=-4$$

$$(-2)-(-2)=(-2)+(+2)$$
$$=0$$

3. Textbook, page 23, "Put into Practice," questions 10.a., 10.c., 10.e., 10.g., and 10.i.

10. a. $(-5)-(-3)-(+2)=(-5)+(+3)+(-2)$

$=(-7)+(+3)$ ← Add the negative integers first.

$=-4$

c. $(+10)-(-4)-(+12)=(+10)+(+4)+(-12)$

$=(+14)+(-12)$ ← Add the positive integers first.

$=+2$

e. $(+20)-(+15)-(-25)=(+20)+(-15)+(+25)$

$=(+45)+(-15)$ ← Add the positive integers first.

$=+30$

g. $(-13)+(-2)-(-15)=(-13)+(-2)+(+15)$

$=(-15)+(+15)$ ← Add the negative integers first.

$=0$

i. $(-20)-(-5)+(+17)=(-20)+(+5)+(+17)$

$=(-20)+(+22)$ ← Add the positive integers first.

$=+2$

4. Textbook, page 23, "Put into Practice," question 9

9. a. $+65$ **b.** $+51$ **c.** $+54$

d. -34 **e.** $+146$ **f.** -109

g. 0 **h.** -100 **i.** $+100$

Lesson 5: Multiplying Integers

1. Textbook, page 27, "Put into Practice," question 1

1.

Question	Tile Picture	Product
$(+5)\times(+1)$		$+5$
$(+5)\times(-1)$		-5
$(-5)\times(-1)$		$+5$
$(-3)\times(+1)$		-3
$(-3)\times 0$	No tiles	0

2. Textbook, pages 27 and 28, "Put into Practice," questions 2 to 4

2.

I	II
$(+4)\times(+3)=+12$	$(-5)\times(+3)=-15$
$(+4)\times(+2)=+8$	$(-5)\times(+2)=-10$
$(+4)\times(+1)=+4$	$(-5)\times(+1)=-5$
$(+4)\times 0=0$	$(-5)\times 0=0$
$(+4)\times(-1)=-4$	$(-5)\times(-1)=+5$
$(+4)\times(-2)=-8$	$(-5)\times(-2)=+10$
$(+4)\times(-3)=-12$	$(-5)\times(-3)=+15$

In column I, as the second factor decreases by 1, the product decreases by 4. When the second factor becomes negative, the product becomes negative.

In column II, as the second factor decreases by 1, the product increases by 5. When the second factor becomes negative, the product becomes positive.

3. When a positive number is multiplied by a positive number, the answer is **positive**.

   When a positive number is multiplied by a negative number, the answer is **negative**.

   When a negative number is multiplied by a positive number, the answer is **negative**.

   When a negative number is multiplied by a negative number, the answer is **positive**.

   When two numbers with the same sign are multiplied, the product is **positive**.

   When two numbers with opposite signs are multiplied, the product is **negative**.

4. **a.** negative $(-2)\times(+6)=-12$ **b.** negative $3\times(-4)=-12$

   c. positive $(-1)\times(-2)=+2$ **d.** positive $(-4)\times(-4)=+16$

   e. positive $(-5)\times(-2)=+10$ **f.** zero $(-1)\times 0=0$

   g. zero $1\times 0=0$ **h.** negative $(-12)\times 2=-24$

   i. positive $(-7)\times(-3)=+21$

3. Textbook, pages 28 and 29, "Put into Practice," questions 5 to 7

5. **a.** There are three negative factors. Because 3 is an odd number, the product is negative.

   b. One factor is zero, so the product is zero.

   c. One factor is zero, so the product is zero.

   d. One factor is zero, so the product is zero.

   e. There are two negative factors. Because 2 is an even number, the product is positive.

   f. There are three negative factors. Because 3 is an odd number, the product is negative.

   g. There are four negative factors. Because 4 is an even number, the product is positive.

   h. One factor is zero, so the product is zero.

i. There are two negative factors. Because 2 is an even number, the product is positive.

j. There are three negative factors. Because 3 is an odd number, the product is negative.

k. There are three negative factors. Because 3 is an odd number, the product is negative.

l. There are five negative factors. Because 5 is an odd number, the product is negative.

m. One factor is zero, so the product is zero.

n. One factor is zero, so the product is zero.

6. a. False. The product of a negative integer and a positive integer is always negative.
b. True. For example, $(+3)\times(+2)=+6$.
c. True. For example, $(-3)\times(-2)=+6$.
d. False. The product of an even number of negative integers is a positive integer.
e. True. For example, $(-3)\times(-2)\times(-1)=-6$.

7. a. $(+2)(-6)=-12$ **b.** $(-8)(+3)=-24$
c. $(+5)(-6)=-30$ **d.** $(-3)(+8)=-24$
e. $(-1000)(0)=0$

The products in order from least to greatest are $-30, -24, -24, -12,$ and 0.

4. Textbook, page 30, "Put into Practice," questions 1 and 2

1. a. i. The product of a positive integer and a negative integer is negative.
ii. The product of a positive integer and a positive integer is positive.
iii. If zero is a factor, the product is zero.

b. i. The product of a negative integer and a negative integer is positive.
ii. The product of a negative integer and a positive integer is negative.
iii. If zero is a factor, the product is zero.

2. a. negative $(-15)\times 8=-120$ **b.** negative $(19)\times(-10)=-190$
c. positive $(-17)\times(-5)=+85$ **d.** negative $(-43)\times(20)=-860$

e. positive $(-70)\times(-18)=+1260$

f. negative $(+33)\times(-30)=-990$

g. negative $14\times(-62)=-868$

h. negative $(-13)\times 14=-182$

i. negative $(+17)\times(-17)=-289$

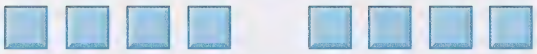
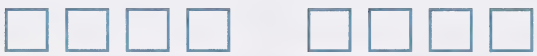
j. negative $(-21)\times(16)=-336$

k. positive $(-25)\times(-18)=+450$

Lesson 6: Dividing Integers

1. Textbook, pages 32 and 33, "Put into Practice," questions 1 to 3

1.

Tile Picture	Division Statement	Result
	$(+8)\div(+2)$	$+4$
	$(+6)\div(+3)$	$+2$
	$(+3)\div(+3)$	$+1$
	$(-3)\div(+3)$	-1
	$(-6)\div(+3)$	-2
	$(-8)\div(+2)$	-4

2. a. The quotient will be positive when you divide a positive number by a positive number.

b. The quotient will be negative when you divide a negative number by a positive number.

3. a. The results for multiplication and division are the same.

b. i. You would expect a negative result when you divide a positive number by a negative number.

ii. You would expect a positive result when you divide a negative number by a negative number.

2. Textbook, pages 35 and 36, "Put into Practice," questions 1, 2, 4, 5.b., 5.c., and 6

1. a. $(+15)\div(+5)=+3$ **Check:** $(+5)\times(+3)=+15$

b. $(-50)\div(-10)=+5$ **Check:** $(-10)\times(+5)=-50$

c. $(-12)\div(+3)=-4$ **Check:** $(+3)\times(-4)=-12$

d. $(+24)\div(-4)=-6$ **Check:** $(-4)\times(-6)=+24$

e. $(-66)\div(-11)=+6$ **Check:** $(-11)\times(+6)=-66$

f. $(-27)\div(-3)=+9$ **Check:** $(-3)\times(+9)=-27$

g. $(-1)\div(-1)=+1$ **Check:** $(-1)\times(+1)=-1$

h. $(+1)\div(-1)=-1$ **Check:** $(-1)\times(-1)=+1$

i. $(-1)\div(+1)=-1$ **Check:** $(+1)\times(-1)=-1$

2. a. negative $(+8)\div(-2)=-4$ **b.** positive $(+16)\div(+2)=+8$

c. positive $(-14)\div(-7)=+2$ **d.** negative $(-24)\div(+3)=-8$

e. positive $(-25)\div(-5)=+5$ **f.** negative $(+18)\div(-3)=-6$

g. positive $(-99)\div(-99)=+1$ **h.** negative $(999)\div(-999)=-1$

i. negative $(-999)\div 999=-1$

4. a. $\dfrac{+15}{+5}=+3$ **b.** $\dfrac{+36}{-6}=-6$

c. $\dfrac{-48}{-6}=+8$ **d.** $\dfrac{-55}{+5}=-11$

e. $\dfrac{+42}{-7}=-6$ **f.** $\dfrac{-27}{-9}=+3$

g. $(-14)\div(+2)=-7$ **h.** $(-32)\div(-8)=+4$

i. $(-64)\div(-8)=+8$ **j.** $(-39)\div(+3)=-13$

k. $(-123)\div 456=-0.269\,736\ldots$
$\doteq -0.270$

l. $7890\div(-123)=-64.146\,341\ldots$
$\doteq -64.146$

m. $0 \div 1234 = 0$

n. $0 \div (-5678) = 0$

o. $1.2345 \div (-1.2345) = -1$

p. $(-5.6789) \div 5.6789 = -1$

5. b. When any non-zero integer is divided by its opposite, the quotient is -1. For example, $(-6) \div (+6) = -1$.

c. When you divide zero by a negative number, the quotient is zero. For example, $0 \div (+7) = 0$.

6. a. $(+8) \div (-4) = -2$

b. $(-24) \div (+4) = -6$

c. $(-33) \div (-3) = +11$

d. $(+72) \div (+6) = +12$

e. $(+49) \div (+7) = +7$

f. $(-56) \div (-7) = +8$

g. $(-36) \div (-18) = +2$

h. $(-8) \div (-4) = +2$

3. Textbook, pages 37 and 38, "Put into Practice," questions 1 to 6

1. i. There are 150 occupied seats and 50 unoccupied seats.

$$\begin{aligned} 150 \times (\$5) + 50 \times (-\$2) &= \$750 + (-\$100) \\ &= \$650 \end{aligned}$$

The profit is $650.

ii. There are 40 occupied seats and 160 unoccupied seats.

$$\begin{aligned} 40 \times (\$5) + 160 \times (-\$2) &= \$200 + (-\$320) \\ &= -\$120 \end{aligned}$$

The loss is $120.

iii. There are 100 occupied seats and 100 unoccupied seats.

$$\begin{aligned} 100 \times (\$5) + 100 \times (-\$2) &= \$500 + (-\$200) \\ &= \$300 \end{aligned}$$

The profit is $300.

iv. There are 55 occupied seats and 145 unoccupied seats.

$$55\times(\$5)+145\times(-\$2)=\$275+(-\$290)$$
$$=-\$15$$

The loss is $15.

v. There are 200 occupied seats and 0 unoccupied seats

$$200\times(\$5)+0\times(-\$2)=\$1000+(\$0)$$
$$=\$1000$$

The profit is $1000.

vi. There is 1 occupied seat and 199 unoccupied seats.

$$1\times(\$5)+199\times(-\$2)=\$5+(-\$398)$$
$$=-\$393$$

The loss is $393.

b. You know the loss is only $15 when 55 seats are occupied. What is the profit or loss for 56 occupied seats?

$$56\times(\$5)+144\times(-\$2)=\$280+(-\$288)$$
$$=-\$8$$

The loss is decreasing; it is only $8.

What is the profit or loss for 57 occupied seats?

$$57\times(\$5)+143\times(-\$2)=\$285+(-\$286)$$
$$=-\$1$$

Now the loss is only $1.

What is the profit or loss for 58 occupied seats?

$$58\times(\$5)+142\times(-\$2)=\$290+(-\$284)$$
$$=\$6$$

The profit is \$6.

Therefore, more than 57 seats must be occupied for a profit to be made.

2. Determine how far the balloon descended in 6 min.

$$6\times190=1140$$

The balloon was 1140 m higher 6 min ago.

3. temperature change = final temperature – original temperature

$$=-19°C-(-14°C)$$
$$=-19°C+(+14°C)$$
$$=-5°C$$

The temperature drops $5°C$ because of the wind chill.

4. Write the loss as -1200. For 5 days, $5\times(-1200)=-6000$. The loss was \$6000.

5. a.

From (°C)	To (°C)	Change (°C)
−4	5	+9
5	−10	−15
−10	−15	−5
−15	−7	+8

b. The sum of the numbers in the Change column is calculated as follows:

$$(+9)+(-15)+(-5)+(+8)=(+17)+(-20)$$
$$=-3$$

c. The change between the first and last temperatures is calculated as follows:

$$\begin{aligned}\text{last temperature} - \text{first temperature} &= (-7)-(-4)\\ &= (-7)+(+4)\\ &= -3\end{aligned}$$

The temperature dropped $3°C$ between the first temperature and the last temperature.

6. a.

Day	Opening Price ($)	Closing Price ($)	Daily Change ($)
Mon.	23	21	-2
Tues.	21	24	$+3$
Wed.	24	52	$+28$
Thurs.	52	19	-33
Fri.	19	21	$+2$

b. The sum of the numbers in the Daily Change column is calculated as follows:

$$\begin{aligned}(-2)+(+3)+(+28)+(-33)+(+2) &= (+31)+(-33)\\ &= -2\end{aligned}$$

c. The change from Monday morning to Friday afternoon is calculated as follows:

$$\begin{aligned}\text{price on Friday afternoon} - \text{price on Monday morning} &= (+21)-(+23)\\ &= (+21)+(-23)\\ &= -2\end{aligned}$$

The price dropped $2.

Section 2: Decimals

Lesson 1: Rounding

1. Textbook, page 72, "Investigation"

B is at 3.6 and is closer to **4**.
So, 3.6 rounds to **4**.
C is at **3.5** and it is halfway between **3** and **4**.

In this case, we round up to **4**.

2. Textbook, page 73, "Put into Practice," questions 4 to 6

4. **a.** 12 **b.** 13 **c.** 13 **d.** 103
e. 104 **f.** 104 **g.** 1003 **h.** 15
i. 15 **j.** 15 **k.** 15 **l.** 15

5. **a.** 10 **b.** 10 **c.** 10 **d.** 100
e. 100 **f.** 100 **g.** 1000 **h.** 10
i. 20 **j.** 20 **k.** 10 **l.** 10

6. **a.** 300 **b.** 400 **c.** 400 **d.** 100
e. 900 **f.** 1000 **g.** 1000 **h.** 300

3. **a.** 5.7 **b.** 13.6 **c.** 123.5 **d.** 0.1 **e.** 3.0

4. **a.** 5.75 **b.** 13.55 **c.** 123.48 **d.** 0.07 **e.** 3.05

Lesson 2: Adding and Subtracting Decimals

1. Textbook, pages 74 and 75, "Put into Practice," questions 1.a., 1.c., 2.a., 2.c., 3, and 4

1. **a.**

$$\begin{array}{r} {\scriptstyle 1} \\ \$3.50 \\ \$2.85 \\ +\ \$4.60 \\ \hline \$10.95 \end{array}$$

c.

$$\begin{array}{r} {\scriptstyle 1\ 1} \\ \$7.04 \\ \$2.95 \\ +\ \$1.01 \\ \hline \$11.00 \end{array}$$

2. a.
$$\begin{array}{r} \$8.69 \\ -\ \$3.24 \\ \hline \$5.45 \end{array}$$

c.
$$\begin{array}{r} \overset{8}{\$}\overset{10}{1}\overset{16}{9}.1\,6 \\ -\ \$14.58 \\ \hline \$4.58 \end{array}$$

3. a. $5.61 rounds to $6.
$3.48 rounds to $3.

The answer should be close to $\$6 - \$3 = \$3$.

b. $2.79 rounds to $3.
$4.35 rounds to $4.
$3.12 rounds to $3.

The answer should be close to $\$3 + \$4 + \$3 = \$10$.

c. $9.31 rounds to $9.
$2.24 rounds to $2.
$3.11 rounds to $3.

The answer should be close to $\$9 + \$2 + \$3 = \$14$.

d. $3.86 rounds to $4.
$1.32 rounds to $1.

The answer should be close to $\$4 - \$1 = \$3$.

e. $7.04 rounds to $7.
$3.42 rounds to $3.

The answer should be close to $\$7 - \$3 = \$4$.

f. $8.17 rounds to $8.
$5.62 rounds to $6.

The answer should be close to $\$8 - \$6 = \$2$.

4. a.
$$\begin{array}{r} \overset{5}{\$}5.\overset{11}{6}1 \\ -\ \$3.48 \\ \hline \$2.13 \end{array}$$

b.
$$\begin{array}{r} \overset{1}{\$}\overset{1}{2}.79 \\ \$4.35 \\ +\ \$3.12 \\ \hline \$10.26 \end{array}$$

c.
$$\begin{array}{r} \$9.31 \\ \$2.24 \\ +\ \$3.11 \\ \hline \$14.66 \end{array}$$

d.
$$\begin{array}{r} \$3.86 \\ -\ \$1.32 \\ \hline \$2.54 \end{array}$$

e.
$$\begin{array}{r} \$\overset{6}{\cancel{7}}.\overset{10}{\cancel{0}}4 \\ -\ \$3.42 \\ \hline \$3.62 \end{array}$$

f.
$$\begin{array}{r} \$\overset{7}{\cancel{8}}.\overset{11}{\cancel{1}}7 \\ -\ \$5.62 \\ \hline \$2.55 \end{array}$$

The answers are reasonable. They are close to the estimates in question 3.

2. Textbook, page 77, "Investigation"

8.4 rounds to $\boxed{8}$.

2.34 rounds to $\boxed{2}$.

An estimate of the answer is $\boxed{6}$.

$$\begin{array}{r} 8.\overset{3}{\cancel{4}}\overset{10}{0} \\ -\ 2.34 \\ \hline 6.06 \end{array}$$

$\boxed{6.06}$ is reasonably close to my estimate of $\boxed{6}$.

3. Textbook, pages 77 to 79, "Put into Practice," questions 1.j., 1.l., 2.a., 2.c., 2.d., 2.e., 3.c., 3.e., 3.g., 3.j., 3.l., and 4

1. j.
$$\begin{array}{r} \overset{1}{} \\ 3.70 \\ +\ 0.55 \\ \hline 4.25 \end{array}$$

1. l.
$$\begin{array}{r} \overset{4}{\cancel{5}}.\overset{16}{\cancel{6}} \\ -\ 0.9 \\ \hline 4.7 \end{array}$$

2. a. First, estimate an answer.

17.28 rounds to 17.
32.61 rounds to 33.

The answer should be close to $17 + 33 = 50$.

Second, do the calculation.

$$\begin{array}{r} 17.28 \\ +\ 32.61 \\ \hline 49.89 \end{array}$$

The answer is reasonable. 49.89 is close to the estimate of 50.

2. c. First, estimate an answer.

42.25 rounds to 42.
18.27 rounds to 18.

The answer should be close to $42 - 18 = 24$.

Second, do the calculation.

$$\begin{array}{r} {\scriptstyle 3\,1\,1\,1\,1\,15} \\ 4\cancel{2}.\cancel{2}\,\cancel{5} \\ -\ 18.27 \\ \hline 23.98 \end{array}$$

The answer is reasonable. The answer 23.98 is close to the estimate of 24.

2. d. First, estimate an answer.

184.9 rounds to 185.
30.65 rounds to 31.

The answer should be close to $185 + 31 = 216$.

Second, do the calculation.

$$\begin{array}{r} {\scriptstyle 1\ \ 1} \\ 184.90 \\ +\ 30.65 \\ \hline 215.55 \end{array}$$

The answer is reasonable. The answer 215.55 is close to the estimate of 216.

2. e. First, estimate an answer.

194.6 rounds to 195.
76.48 rounds to 76.

The answer should be close to $195 - 76 = 119$.

Second, do the calculation.

$$\begin{array}{r} {\scriptstyle 8\,14\ 5\ 10} \\ 194.60 \\ +\ 76.48 \\ \hline 118.12 \end{array}$$

The answer is reasonable. The answer 118.12 is close to the estimate of 119.

3. c.
$$\begin{array}{r} {\scriptstyle 1} \\ 102.70 \\ +\ 91.83 \\ \hline 194.53 \end{array}$$

e.
$$\begin{array}{r} {\scriptstyle 7\,13\ 15\,10} \\ 84.60 \\ -\ 67.75 \\ \hline 16.85 \end{array}$$

g.
$$\begin{array}{r} {\scriptstyle 3\ 9\,10} \\ 14.00 \\ -\ 0.15 \\ \hline 13.85 \end{array}$$

j.
$$\begin{array}{r} {\scriptstyle 5\,9\,10} \\ 3.600 \\ -\ 2.035 \\ \hline 1.565 \end{array}$$

l.
$$\begin{array}{r} {\scriptstyle 1\ \ 1} \\ 28.000 \\ 2.445 \\ +\ 3.090 \\ \hline 33.535 \end{array}$$

4. a. height of tree now = original height + growth

= 0.9 m + 1.8 m

Do the calculation.

$$\begin{array}{r} {\scriptstyle 1} \\ 0.9\ \text{m} \\ +\ 1.8\ \text{m} \\ \hline 2.7\ \text{m} \end{array}$$

The height of the tree now is 2.7 m.

b. First, find the cost of the three books, including the GST.

$$\begin{array}{r} {\scriptstyle 1\ 1} \\ \$4.98 \\ \$1.02 \\ \$2.10 \\ +\ \$0.68 \\ \hline \$8.78 \end{array}$$

The cost of the fourth book is $10.00 – $8.78.

Do the calculation.

$$\begin{array}{r} {\scriptstyle 9\ 9\ 10} \\ \$10.00 \\ -\ \$8.78 \\ \hline \$1.22 \end{array}$$

The fourth book cost $1.22.

c. Sheri's profit = money she collected – money she paid the Sun

= $156.10 – $93.66

Do the calculation.

$$\begin{array}{r} {\scriptstyle 5\ 10\ 10} \\ 156.10 \\ -\ 93.66 \\ \hline 62.44 \end{array}$$

Sheri kept $62.44.

d. The largest ball allowed is $21.725\ \text{cm} + 0.25\ \text{cm}$.

Do the calculation.

$$\begin{array}{r} 21.725\ \text{cm} \\ +\ 0.250\ \text{cm} \\ \hline 21.975\ \text{cm} \end{array}$$

The largest ball allowed is 21.975 cm.

The smallest ball allowed is $21.725\ \text{cm} - 0.25\ \text{cm}$.

Do the calculation.

$$\begin{array}{r} {\scriptstyle 6\ 12} \\ 21.\cancel{7}\cancel{2}5\ \text{cm} \\ -\ 0.250\ \text{cm} \\ \hline 21.475\ \text{cm} \end{array}$$

The smallest ball allowed is 21.475 cm.

e. First, find the total price of the two CDs.

The price for two CDs is $\$49.93 - \$11.95$.

Do the calculation.

$$\begin{array}{r} {\scriptstyle 8\ 1813} \\ \$\cancel{4}\cancel{9}.\cancel{9}\cancel{3} \\ -\ 11.95 \\ \hline \$37.98 \end{array}$$

The two CDs cost \$37.98.

\$37.98 is close to \$38.00.

Each CD costs about $\$38.00 \div 2$ or \$19.00.

Lesson 3: Multiplying Decimals

1. Textbook, pages 82 and 83, "Investigation," questions 1 to 3

1. a. There are 2 decimal places in $0.78.
b. There are 2 decimal places in $2.34.
c. There is the same number of decimal places in $0.78 and in the answer ($2.34).

2. a. There is 1 decimal place in 1.3 m.
b. There is 1 decimal place in 6.5 m.
c. There is the same number of decimal places in 1.3 m and in the answer (6.5 m).

3. When you multiply a decimal number by a whole number, there will be the same number of decimal places in the answer as there were in the original decimal number.

2. Textbook, page 84, Put into Practice, questions 1 to 5

1. a. Round the numbers.

6.3 rounds to 6.

Therefore, 6.3×3 is about 6×3 or 18.

For your estimate, you can write the following:

$$6.3 \times 3 \doteq 6 \times 3$$
$$\doteq 18$$

b. $14.2 \times 4 \doteq 14 \times 4$
$\doteq 56$

c. $4 \times 23.2 \doteq 4 \times 23$
$\doteq 92$

d. $5 \times 12.7 \doteq 5 \times 13$
$\doteq 65$

e. $0.84 \times 6 \doteq 1 \times 6$
$\doteq 6$

f. $3.07 \times 8 \doteq 3 \times 8$
$\doteq 24$

g. $7 \times 1.92 \doteq 7 \times 2$
$\doteq 14$

h. $9 \times 0.801 \doteq 9 \times 1$
$\doteq 9$

i. $0.802 \times 4 \doteq 1 \times 5$
$\doteq 5$

j. $0.103 \times 9 \doteq 0 \times 9$
$\doteq 0$

k. $7 \times 1.86 \doteq 7 \times 2$
$\doteq 14$

l. $9 \times 0.809 \doteq 9 \times 1$
$\doteq 9$

2. a.
$$\begin{array}{r} 6.3 \\ \times\ 3 \\ \hline 18.9 \end{array}$$

b.
$$\begin{array}{r} {\scriptstyle 1} \\ 14.2 \\ \times\ 4 \\ \hline 56.8 \end{array}$$

c.
$$\begin{array}{r} {\scriptstyle 1} \\ 23.2 \\ \times\ 4 \\ \hline 92.8 \end{array}$$

d.
$$\begin{array}{r} {\scriptstyle 1\,3} \\ 12.7 \\ \times\ 5 \\ \hline 63.5 \end{array}$$

e.
$$\begin{array}{r} {\scriptstyle 5\,2} \\ 0.84 \\ \times\ 6 \\ \hline 5.04 \end{array}$$

f.
$$\begin{array}{r} {\scriptstyle 5} \\ 3.07 \\ \times\ 8 \\ \hline 24.56 \end{array}$$

g.
$$\begin{array}{r} {\scriptstyle 6\,1} \\ 1.92 \\ \times\ 7 \\ \hline 13.44 \end{array}$$

h.
$$\begin{array}{r} 0.801 \\ \times\ 9 \\ \hline 7.209 \end{array}$$

i.
$$\begin{array}{r} {\scriptstyle 1} \\ 0.802 \\ \times\ 5 \\ \hline 4.010 \end{array}$$

j.
$$\begin{array}{r} {\scriptstyle 2} \\ 0.103 \\ \times\ 9 \\ \hline 0.927 \end{array}$$

k.
$$\begin{array}{r} {\scriptstyle 6\,4} \\ 1.86 \\ \times\ 7 \\ \hline 13.02 \end{array}$$

l.
$$\begin{array}{r} {\scriptstyle 8} \\ 0.809 \\ \times\ 9 \\ \hline 7.281 \end{array}$$

The answers are reasonable. They are close to the estimates.

3. savings $= 12\ \text{h} \times \$5.90/\text{h}$

Do the calculation.

$$\begin{array}{r} \$5.90 \\ \times\ 12 \\ \hline 11\,80 \\ +\ 59\,00 \\ \hline \$70.80 \end{array}$$

They saved $70.80.

4. a. The group paid $12 \times \$5.19$.

Do the calculation.

$$\begin{array}{r} \$5.19 \\ \times\ 12 \\ \hline 10\,38 \\ +\ 51\,90 \\ \hline \$62.28 \end{array}$$

The group paid $62.28 for 12 rolls.

They saved $\$5.69 - \$5.19 = \$0.50$ a roll.

They saved $12 \times \$0.50 = \$6.00$ on the 12 rolls.

b. Another 4 rolls cost $4 \times \$5.19$.

$$\begin{array}{r} \$5.19 \\ \times\ 4 \\ \hline \$20.76 \end{array}$$

They should pay $20.76.

c. The total cost is $\$62.28 + \$20.76$.

Do the calculation.

$$\begin{array}{r} {\scriptstyle 1\ 1} \\ \$62.28 \\ +\ \$20.76 \\ \hline \$83.04 \end{array}$$

The total cost is $83.04.

The total saved on $12 + 4$ or 16 rolls is $16 \times \$0.50 = \$8.00$.

d. If they pay $5.19/roll, for the $8.00 saved, they can buy another roll.

5. a. The cost for 120 adults is $120 \times \$8.25$.

Do the calculation.

$$\begin{array}{r} \$8.25 \\ \times\ 1\ 20 \\ \hline 0\ 00 \\ 165\ 00 \\ +\ 825\ 00 \\ \hline \$990.00 \end{array}$$

The cost for 120 adults is $990.00.

b. The cost for 25 students is $25 \times \$5.75$.

Do the calculation.

$$\begin{array}{r} \$5.75 \\ \times\ 25 \\ \hline 28\ 75 \\ +\ 115\ 00 \\ \hline \$143.75 \end{array}$$

The cost for 25 students is $143.75.

c. The cost for 240 adults and 130 students is $(240 \times \$8.25) + (130 \times \$5.75)$.

Do the calculation.

$$\begin{array}{r} \$8.25 \\ \times\ 2\ 40 \\ \hline 0\ 00 \\ 330\ 00 \\ +\ 165\ 00 \\ \hline \$1980.00 \end{array} \qquad \begin{array}{r} \$5.75 \\ \times\ 1\ 30 \\ \hline 0\ 00 \\ 172\ 50 \\ +\ 575\ 00 \\ \hline \$747.50 \end{array} \qquad \begin{array}{r} \$1980.00 \\ +\ \$747.50 \\ \hline \$2727.50 \end{array}$$

The cost for 240 adults and 130 students is $2727.50.

3. Textbook, page 85, "Investigation," questions 1 to 3

1.

A	B	C
$1000 \times 5 = 5000$	$1000 \times 0.3 = 300$	$1000 \times 0.24 = 240$
$100 \times 5 = 500$	$100 \times 0.3 = 30$	$100 \times 0.24 = 24$
$10 \times 5 = 50$	$10 \times 0.3 = 3$	$10 \times 0.24 = 2.4$
$1 \times 5 = 5$	$1 \times 0.3 = 0.3$	$1 \times 0.24 = 0.24$
$0.1 \times 5 = 0.5$	$0.1 \times 0.3 = 0.03$	$0.1 \times 0.24 = 0.024$
$0.01 \times 5 = 0.05$	$0.01 \times 0.3 = 0.003$	$0.01 \times 0.24 = 0.0024$
$0.001 \times 5 = 0.005$	$0.001 \times 0.3 = 0.0003$	$0.001 \times 0.24 = 0.000\ 24$

2. a. If a number is multiplied by 10, 100, 1000, . . . , the number gets larger.

b. The decimal point moves to the right.

c. The decimal point moves the same number of places to the right as the number of zeros in the power of 10.

3. a. If a number is multiplied by 0.1, 0.01, 0.001, . . . , the number gets smaller.

b. The decimal point moves to the left.

c. The decimal point moves the same number of places to the left as the number of decimal places in the power of 10.

4. Textbook, page 86, "Put into Practice", questions 1 to 4

1. a. $1000 \times 0.5 = 500$ — 3 zeros — 0500.

b. $6.48 \times 10 = 64.8$ — 1 zero — 64.8

c. $0.416 \times 100 = 41.6$ — 2 zeros — 041.6

d. $0.73 \times 1000 = 730$ — 3 zeros — 0730.

e. $100 \times 30.4 = 3040$ — 2 zeros — 3040.

f. $1.004 \times 1000 = 1004$ — 3 zeros — 1004.

2. a. $4 \times 0.01 = 0.04$ — 2 decimal places — .04

b. $34 \times 0.001 = 0.034$ — 3 decimal places — .034

c. $6.2 \times 0.1 = 0.62$ — 1 decimal place — .62

d.	$0.01 \times 128 = 1.28$	2 decimal places	1.28
e.	$0.1 \times 7.4 = 0.74$	1 decimal place	.74
f.	$1.8 \times 0.001 = 0.0018$	3 decimal places	.0018
g.	$0.88 \times 0.1 = 0.088$	1 decimal place	.088
h.	$0.4 \times 0.01 = 0.004$	2 decimal places	.004
i.	$0.03 \times 0.1 = 0.003$	1 decimal place	.003
j.	$0.96 \times 0.001 = 0.000\ 96$	3 decimal places	.000 96
k.	$0.01 \times 0.7 = 0.007$	2 decimal places	.007
l.	$0.001 \times 0.36 = 0.000\ 36$	3 decimal places	.000 36

3. a. cost of printing $= 100 \times \$0.04 = \$4.00$
cost of delivering $= 100 \times \$0.05 = \$5.00$

b. cost of printing $= 1000 \times \$0.04 = \$40.00$
cost of delivering $= 1000 \times \$0.05 = \$50.00$

c. cost of printing $= 10\ 000 \times \$0.04 = \$400.00$
cost of delivering $= 10\ 000 \times \$0.05 = \$500.00$

4. amount of juice $= 23 \times 0.1$ L
$= 2.3$ L

5. a. Method 1: Use Powers of 10

4.12 is 412×0.01.
6.34 is 634×0.01.

So, $4.12 \times 6.34 = 412 \times 0.01 \times 634 \times 0.01$

$$\begin{array}{r} 412 \\ \times\ 634 \\ \hline 1648 \\ 12360 \\ +\ 247200 \\ \hline 261208 \end{array}$$

Multiply 261 208 by 0.01×0.01.

$$261\,208 \times 0.01 \times 0.01 = 2612.08 \times 0.01$$
$$= 26.1208$$

Therefore, $4.12 \times 6.34 = 26.1208$

Method 2: Use an Estimate

4.12 rounds to 4.
6.34 rounds to 6.

The estimate is $4 \times 6 = 24$.

Multiply as in Method 1.

$$412 \times 634 = 261\,208$$

The decimal must go between the 6 and the 1 since 26.1208 is closest to your estimate of 24.

Method 3: Total the Decimal Places in the Numbers Being Multiplied

There are 2 decimal places in 4.12. There are 2 decimal places in 6.34. There will be $2 + 2 = 4$ decimal places in the answer.

$$\begin{array}{r} 4.12 \\ \times\ 6.34 \\ \hline 1648 \\ 12360 \\ +\ 247200 \\ \hline 26.1208 \end{array}$$

← There are 4 decimal places in the answer.

b. Method 1: Use Powers of 10

$6.123 = 6123 \times 0.001$
$12.3 = 123 \times 0.1$

So, $6.123 \times 12.3 = 6123 \times 123 \times 0.001 \times 0.1$.

$$\begin{array}{r} 6123 \\ \times\ 123 \\ \hline 18369 \\ 122460 \\ +\ 612300 \\ \hline 753129 \end{array}$$

Multiply 753 129 by 0.001×0.1.

$$753\,129 \times 0.001 \times 0.1 = 753.129 \times 0.1$$
$$= 75.3129$$

Therefore, $6.123 \times 12.3 = 75.3129$.

Method 2: Use an Estimate

6.123 rounds to 6.
12.3 rounds to 12.

The estimate is $6 \times 12 = 72$.

Multiply as in Method 1.

$$6123 \times 123 = 753\,129$$

The decimal must go between the 5 and the 3 since 75.3129 is closest to the estimate of 72.

Method 3: Total the Decimal Places in the Numbers Being Multiplied

There are 3 decimal places in 6.123. There is 1 decimal place in 12.3. There will be $3+1=4$ decimal places in the answer.

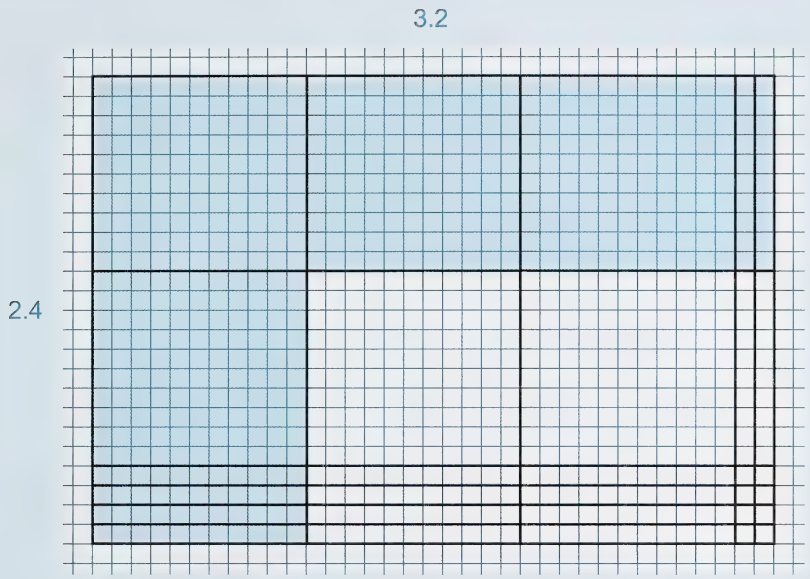
$$\begin{array}{r} 6.123 \\ \times\ 12.3 \\ \hline 18369 \\ 122460 \\ +\ 612300 \\ \hline 75.3129 \end{array} \quad \longleftarrow \text{ There are 4 decimal places in the answer.}$$

6. area $= \text{length} \times \text{width}$

$= 7.2 \text{ cm} \times 3.2 \text{ cm}$

$= 23.04 \text{ cm}^2$

7. a.



3.2 is 3 flats and 2 rods.
2.4 is 2 flats and 4 rods.

When the rectangle is filled in, the total area is covered by 6 flats + 16 rods + 8 tiles.

Therefore, $3.2 \times 2.4 = 6 \text{ flats} + 16 \text{ rods} + 8 \text{ tiles}$

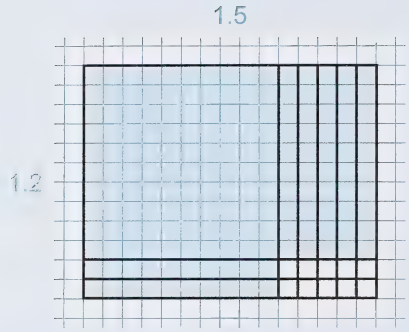
$= 6 \text{ flats} + (10 \text{ rods} + 6 \text{ rods}) + 8 \text{ tiles}$

$= 6 \text{ flats} + (1 \text{ flat} + 6 \text{ rods}) + 8 \text{ tiles}$

$= 7 \text{ flats} + 6 \text{ rods} + 8 \text{ tiles}$

$= 7.68$

b.



There are 1 flat, 7 rods, and 10 tiles altogether.

Therefore, $1.2 \times 1.5 = 1 \text{ flat} + 7 \text{ rods} + 10 \text{ tiles}$

$= 1 \text{ flat} + 7 \text{ rods} + 1 \text{ rod} + 0 \text{ tiles}$

$= 1 \text{ flat} + 8 \text{ rods} + 0 \text{ tiles}$

$= 1.80$

8. Textbook, pages 88 and 89, "Put into Practice," questions 1, 2, 4, 5, 6, and 7.a.

1. a. 10.498 765 431 2 ← $9 + 1 = 10$ decimal places
b. 3.060 802 469 083 ← $10 + 2 = 12$ decimal places
c. 2.521 309 876 39 ← $9 + 2 = 11$ decimal places
d. 851.026 123 420 2 ← $8 + 2 = 10$ decimal places

2. a. estimate: $12 \times 6 = 72$
b. estimate: $65 \times 0 = 0$
c. estimate: $11 \times 1 = 11$
d. estimate: $12 \times 7 = 84$
e. estimate: $7 \times 7 = 49$
f. estimate: $66 \times 33 = 2178$

Therefore, questions a., d., and f. will have a product greater than 50.

4. a. $2.3 \times 1.9 \doteq 2 \times 2$
$\doteq 4$

b. $3.2 \times 3.2 \doteq 3 \times 3$
$\doteq 9$

c. $1.84 \times 2.2 \doteq 2 \times 2$
$\doteq 4$

d. $3.4 \times 0.43 \doteq 3 \times 0$
$\doteq 0$

e. $0.04 \times 8.3 \doteq 0 \times 8$
$\doteq 0$

f. $0.87 \times 2.3 \doteq 1 \times 2$
$\doteq 2$

5. **a.** $2.3 \times 1.9 = 4.37$
   b. $3.2 \times 3.2 = 10.24$
   c. $1.84 \times 2.2 = 4.048$
   d. $3.4 \times 0.43 = 1.462$
   e. $0.04 \times 8.3 = 0.332$
   f. $0.87 \times 2.3 = 2.001$

6. height $= 3 \times 22.8$ cm $= 68.4$ cm
   depth $= 3 \times 30.1$ cm $= 90.3$ cm

7. **a.** cost of ribbon $= 3.4$ m $\times \$2.30/\text{m}$
   $= \$7.82$

Lesson 4: Dividing Decimals

1. **Textbook, page 90, "Investigation," question 1 to 3**

   1.

A	B
$3 \div 1000 = 0.003$	$1.2 \div 1000 = 0.0012$
$3 \div 100 = 0.03$	$1.2 \div 100 = 0.012$
$3 \div 10 = 0.3$	$1.2 \div 10 = 0.12$
$3 \div 1 = 3$	$1.2 \div 1 = 1.2$
$3 \div 0.1 = 30$	$1.2 \div 0.1 = 12$
$3 \div 0.01 = 300$	$1.2 \div 0.01 = 120$
$3 \div 0.001 = 3000$	$1.2 \div 0.001 = 1200$

   2. **a.** When a number is divided by 10, 100, 1000, . . . , the number gets smaller.

      b. The decimal point moves to the left.

      c. The decimal point moves the same number of places to the left as there are zeros in the power of 10.

   3. **a.** When a number is divided by 0.1, 0.01, 0.001, . . . , the number gets larger.

      b. The decimal point moves to the right.

      c. The decimal point moves the same number of places to the right as there are decimal places in the power of 10.

2. Textbook, page 91 and 92, "Put into Practice," questions 1 to 8

1. a. i. $5 \div 10 = 0.5$ **ii.** $5 \times 0.1 = 0.5$
b. i. $5 \div 100 = 0.05$ **ii.** $5 \times 0.01 = 0.05$
c. i. $5 \div 1000 = 0.005$ **ii.** $5 \times 0.001 = 0.005$

2. Dividing by 10, 100, 1000, . . . , is the same as multiplying by 0.1, 0.01, 0.001, ...

3. a. i. $5 \div 0.1 = 50$ **ii.** $5 \times 10 = 50$
b. i. $5 \div 0.01 = 500$ **ii.** $5 \times 100 = 500$
c. i. $5 \div 0.001 = 5000$ **ii.** $5 \times 1000 = 5000$

4. Dividing by 0.1, 0.01, 0.001, . . . , is the same as multiplying by 10, 100, 1000, ...

5. a. 0.27 **b.** 0.035 **c.** 0.004
d. 58.7 **e.** 6.97 **f.** 30.4

6. a. 640 **b.** 7000 **c.** 68 300
d. 4000 **e.** 67 000 **f.** 370

7. a. 0.4132 **b.** 0.2195 **c.** 19.2
d. 49.5 **e.** 82 000 **f.** 80

8. Part d. is the smallest answer because you are dividing by the largest number (1000). Part f. is the largest answer because you are dividing by the smallest number (0.001).

3. Textbook, page 94, "Put into Practice," questions 1 and 3

1. a. $13.2 \div 4 \doteq 12 \div 4$ ← 12 is the number closest to 13.2 that is divisible by 4.
$\doteq 3$

b. $37.5 \div 3 \doteq 36 \div 3$
$\doteq 12$
or
$37.5 \div 3 \doteq 39 \div 3$
$\doteq 13$

c. $4.8 \div 6 \doteq 6 \div 6$
$\doteq 1$

d. $87.65 \div 5 \doteq 85 \div 5$
$\doteq 17$

e. $50.4 \div 6 \doteq 48 \div 6$
$\doteq 8$

f. $46.5 \div 6 \doteq 48 \div 6$
$\doteq 8$

3. a.
$$\begin{array}{r} 3.3 \\ 4\overline{)13.2} \\ 12 \\ \hline 1\,2 \\ 1\,2 \\ \hline 0 \end{array}$$

b.
$$\begin{array}{r} 12.5 \\ 3\overline{)37.5} \\ 3 \\ \hline 07 \\ 6 \\ \hline 1\,5 \\ 1\,5 \\ \hline 0 \end{array}$$

c.
$$\begin{array}{r} 0.8 \\ 6\overline{)4.8} \\ 4\,8 \\ \hline 0 \end{array}$$

d.
$$\begin{array}{r} 17.53 \\ 5\overline{)87.65} \\ 5 \\ \hline 37 \\ 35 \\ \hline 2\,6 \\ 2\,5 \\ \hline 15 \\ 15 \\ \hline 0 \end{array}$$

e.
$$\begin{array}{r} 8.4 \\ 6\overline{)50.4} \\ 48 \\ \hline 2\,4 \\ 2\,4 \\ \hline 0 \end{array}$$

f.
$$\begin{array}{r} 7.75 \\ 6\overline{)46.50} \\ 42 \\ \hline 4\,5 \\ 4\,2 \\ \hline 30 \\ 30 \\ \hline 0 \end{array}$$

4. Textbook, pages 94 and 95, "Put into Practice," questions 4 to 10

4. Each pays $\$23.00 \div 4$.

$$
\begin{array}{r}
5.75 \\
4\overline{)23.00} \\
\underline{20} \\
30 \\
\underline{28} \\
20 \\
\underline{20} \\
0
\end{array}
$$

Each student paid $5.75.

5. rate per hour = total charged ÷ number of hours

$= \$49.20 \div 8$ h

$$
\begin{array}{r}
6.15 \\
8\overline{)49.20} \\
\underline{48} \\
12 \\
\underline{8} \\
40 \\
\underline{40} \\
0
\end{array}
$$

George's rate per hour was $6.15.

6. cost per poster = total cost ÷ number of posters
= $56.25 ÷ 5 posters

$$
\begin{array}{r}
11.25 \\
5\overline{)56.25} \\
5 \\
\hline
06 \\
5 \\
\hline
12 \\
10 \\
\hline
25 \\
25 \\
\hline
0
\end{array}
$$

The cost per poster was $11.25.

7. hourly wage = total wages ÷ hours worked
= $223.44 ÷ 28.5 hours

$$
\begin{array}{r}
7.84 \\
28.5\overline{)2234.40} \\
1995 \\
\hline
239\,4 \\
228\,0 \\
\hline
11\,40 \\
11\,40 \\
\hline
0
\end{array}
$$

Kori's hourly wage is $7.84.

8. total cost $= \$10.20 + \$28.60$

$= \$38.80$

$$
\begin{array}{r}
12.93 \\
3\overline{)38.80} \\
3 \\
\hline
08 \\
6 \\
\hline
28 \\
27 \\
\hline
10 \\
9 \\
\hline
1
\end{array}
$$

The cost for two girls is \$12.93 apiece, and one girl must pay \$12.94.

9. total revenue = price per copy × number of copies

$= \$4.25 \times 295\ 136$ ← Use a calculator.

$= \$1\ 254\ 328.00$

The total revenue is \$1 254 328.00.

10. number of steps = total height ÷ height per step

$= 2.52\ \text{m} \div 0.21\ \text{m}$ ← Use a calculator.

$= 12$

There are 12 steps.

Review

1. Textbook, page 64, "Order of Operations," questions 1 to 3

1. a. $25 - (17 - 4) = 25 - 13$

$= 12$

b. $(36 - 9) - 20 = 27 - 20$

$= 7$

c. $24-(7+6)=24-13$
$=11$

d. $(83-64)+5=19+5$
$=24$

2. a. $9(4)+7=36+7$
$=43$

b. $5(2)+12=10+12$
$=22$

c. $7(8)-5+6\times3=56-5+18$
$=51+18$
$=69$

d. $10+45\times5-4(7)=10+225-28$
$=235-28$
$=207$

3. a. $34-7(4-2)^2=34-7(2)^2$
$=34-7(4)$
$=34-28$
$=6$

b. $6^2+9(5+8)=36+9(13)$
$=36+117$
$=153$

2. Textbook, page 68, "Integers," questions 12 to 16

12. a. The greatest number is 9; the least number is -10.
b. The greatest number is 1; the least number is -100.
c. The greatest number is -1; the least number is -1000.

13. a. $(+6)+(-3)=+3$

b. $(+6)-(-3)=(+6)+(+3)$
$=+9$

c. $(+6)\times(-3)=-18$

d. $(+6)\div(-3)=-2$

e. $(-8)+(-2)=-10$

f. $(-8)-(-2)=-8+(+2)$
$=-6$

g. $(-8)\times(-2)=+16$

h. $(-8)\div(-2)=+4$

i. $(-12)+4=-8$

j. $(-12)-4=(-12)+(-4)$
$=-16$

k. $(-12)\times4=-48$

l. $(-12)\div4=-3$

14.

Concert	Income ($)	Expenses ($)	Profit/Loss ($)
A	1234	567	+667
B	567	1234	−667
C	123 456 789	123 456 789	0

15. $\text{total} = (-\$51) + (-\$42) + (+\$154)$

$= (-\$93) + (+\$154)$

$= +\$61$

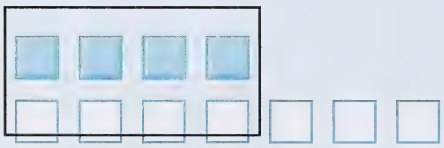
The total profit was $61.

16. total change = number of shares × change per share

$= 123 \times (-\$1.50)$

$= -\$184.50$

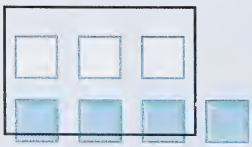
3. a. Use 4 red tiles to represent $+4$. Use 7 white tiles to represent -7.



There are 3 white tiles left over.

Therefore, $+4 + (-7) = -3$.

b. Use 3 white tiles to represent -3. Use 4 red tiles to represent $+4$.



There is 1 red tile left over.

Therefore, $-3 + (+4) = +1$.

c. Use 3 white tiles to represent -3.

To subtract $+2$, or 2 red tiles, you must add 2 zero pairs.

Now, remove 2 red tiles.

There are 5 white tiles left over.

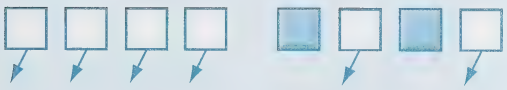
Therefore, $(-3)-(+2)=(-3)+(-2)$

$=-5$

d. Use 4 white tiles to represent -4.

To subtract -6, or 6 white tiles, you must add 2 zero pairs.

Now, remove 6 white tiles.



There are 2 red tiles left over.

Therefore, $-4-(-6)=-4+(+6)$

$=+2$

5. The opposite of -8 is $+8$.

6. If the signs of the integers are the same, their product or quotient is positive. If signs differ, the product or quotient is negative.

7. **Textbook, pages 113 and 114, "Decimals," questions 1 to 9**

1. **a.** Estimate: $6+4=10$
b. Estimate: $25+0=25$
c. Estimate: $1+6=7$
d. Estimate: $23+21=44$
e. Estimate: $198+0=198$
f. Estimate: $1+7=8$
g. Estimate: $1+7844=7845$
h. Estimate: $1+7844=7845$
i. Estimate: $1+7844=7845$

2. **a.**
$$\begin{array}{r} {\scriptstyle 1} \\ 6.3 \\ +3.8 \\ \hline 10.1 \end{array}$$

b.
$$\begin{array}{r} {\scriptstyle 1} \\ 24.96 \\ +0.43 \\ \hline 25.39 \end{array}$$

c.
$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 0.987 \\ +5.632 \\ \hline 6.619 \end{array}$$

d.
$$\begin{array}{r} \\ 23.05 \\ +21.00 \\ \hline 44.05 \end{array}$$

e.
$$\begin{array}{r} \\ 198.000 \\ +0.385 \\ \hline 198.385 \end{array}$$

f.
$$\begin{array}{r} {\scriptstyle 1} \\ 0.5000 \\ +6.9254 \\ \hline 7.4254 \end{array}$$

g.
$$\begin{array}{r} \\ 0.6240 \\ +7844.0000 \\ \hline 7844.6240 \end{array}$$

h.
$$\begin{array}{r} \\ 0.6253 \\ +7844.0000 \\ \hline 7844.6253 \end{array}$$

i.
$$\begin{array}{r} \\ 0.6943 \\ +7844.0000 \\ \hline 7844.6943 \end{array}$$

The answers are close to the estimates.

3. **a.**
$$\begin{array}{r} \\ 6.8 \\ -\ 4.3 \\ \hline 2.5 \end{array}$$

b.
$$\begin{array}{r} {\scriptstyle 5\ 13} \\ 6.\cancel{3} \\ -\ 4.8 \\ \hline 1.5 \end{array}$$

c.
$$\begin{array}{r} {\scriptstyle 5\ 13} \\ 16.\cancel{3} \\ -\ 4.9 \\ \hline 11.4 \end{array}$$

d.
$$\begin{array}{r} {\scriptstyle 15\ 13} \\ \cancel{16}.\cancel{3} \\ -\ 9.4 \\ \hline 6.9 \end{array}$$

e.
$$\begin{array}{r} \\ 26.9 \\ -\ 15.5 \\ \hline 11.4 \end{array}$$

f.
$$\begin{array}{r} {\scriptstyle 5\ 14} \\ 26.\cancel{4} \\ -\ 15.5 \\ \hline 10.9 \end{array}$$

g.
$$\begin{array}{r} {\scriptstyle 1\ 15\ 13} \\ \cancel{2}6.\cancel{3} \\ -\ 16.5 \\ \hline 9.8 \end{array}$$

4. **a.** $16.7 \times 4 = 66.8$ **b.** $52.85 \times 3.1 = 163.835$

c. $425 \times 4.98 = 2116.50$ **d.** $0.256 \times 0.21 = 0.053\ 76$

5. Answers may vary. Sample answers are given.

a. Estimate: $365 \times 5 = 1825$
b. Estimate: $17 \times 4 = 68$
c. Estimate: $144 \times 20 = 2880$
d. Estimate: $2 \times 0 = 0$
e. Estimate: $0 \times 85 = 0$
f. Estimate: $20 \times 1 = 20$
g. Estimate: $24 \times 17 = 408$
h. Estimate: $24 \times 17 = 408$
i. Estimate: $23 \times 17 = 391$

6. Answers may vary. Sample answers are given.

a. Estimate: $2 \div 2 = 1$
b. Estimate: $6 \div 2 = 3$
c. Estimate: $49 \div 7 = 7$
d. Estimate: $16 \div 4 = 4$
e. Estimate: $1000 \div 10 = 100$
f. Estimate: $32 \div 8 = 4$

7. **a.** total cost $= \$2.75 + (2 \times \$1.25) + \$1.99 + \$0.79$

Do the calculation.

$$\begin{array}{r} {\scriptstyle 3\ \ 3} \\ \$2.75 \\ 1.25 \\ 1.25 \\ 1.99 \\ +\ 0.79 \\ \hline \$8.03 \end{array}$$

The total cost was $8.03.

b. a loonie + a quarter + a nickle = \$1.00 + \$0.25 + \$0.05
= \$1.30

Do the calculation.

$$\begin{array}{r} \overset{7}{\$}\overset{10}{8}.03 \\ -1.30 \\ \hline \$6.73 \end{array}$$

The movies really cost \$6.73.

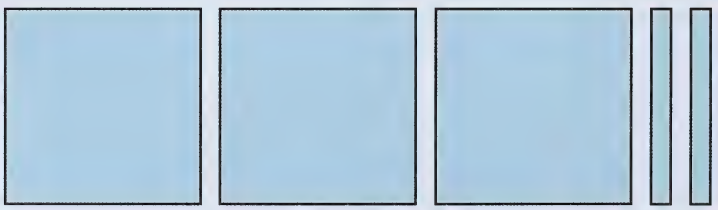
8. total cost = \$25 + \$34 + \$2.50
= \$61.50

each share = \$61.50 ÷ 2
= \$30.75

Each should pay \$30.75.

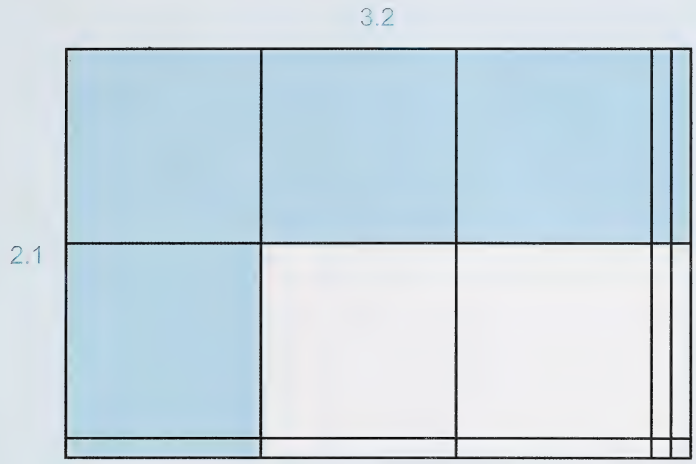
9.
$$\begin{array}{r} 7.\overset{5}{6}\overset{10}{1}4 \\ -\ 1.467 \\ \hline 6.147 \end{array}$$

8. Represent 3.2 with 3 flats and 2 rods.



Represent 2.1 with 2 flats and 1 rod.

Form rectangles with these dimensions.



There are 6 flats, 7 rods, and 2 small tiles.

Therefore, $3.2 \times 2.1 = (6 \times 1) + (7 \times 0.1) + (2 \times 0.01)$

$= 6 + 0.7 + 0.02$

$= 6.72$

9. a. $4.34 \times 0.001 = 0.004\,34$

b. $0.046 \times 10\,000 = 0460$

10. a. $4.34 \div 0.001 = 4340$

b. $0.046 \div 10\,000 = 0.000\,004\,6$

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